Section 1: Introduction

1.1 Purpose and Goal

Urban stormwater runoff discharged into streams, lakes, reservoirs, bays, and oceans from municipal storm drain systems has been identified under local, regional, and national research programs as one of the principal causes of water quality problems in urbanized areas. Urban runoff reaching our waterways has the potential to contain a host of constituents like trash and debris, bacteria and viruses, oil and grease, sediments, nutrients, and metals. These pollutants can adversely affect receiving and coastal waters, associated biota, and public health.

The Federal Clean Water Act was amended in 1987 to address urban runoff. In February of 2001, under the authority of the Clean Water Act amendments and federal National Pollutant Discharge Elimination System (NPDES) Permit regulations, the San Diego Regional Water Quality Control Board (SDRWQCB) issued Order No. 2001-01 to the 18 cities within San Diego County, the County of San Diego, and the Port of San Diego. SDRWQCB Order No. 2001-01 is referred to throughout this document by the common title of the "Municipal Permit."

The *San Diego Bay Watershed Urban Runoff Management Program* (San Diego Bay Watershed URMP) document contains a written account of the overall program to be conducted by the Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, and the Port of San Diego to comply with the Municipal Permit. The document describes all the activities that the San Diego Bay Watershed Copermittees have undertaken, are undertaking, or will undertake, to implement requirements of the Municipal Permit. The watershed-related Municipal Permit obligations are specified under Sections J, K, and L of the Municipal Permit. This material is submitted pursuant to the Municipal Permit, and is subject to Section R.2 of the Municipal Permit concerning enforceability. In addition, the document includes material describing San Diego Bay Watershed Copermittees' plans to go beyond the requirements of the Municipal Permit. The information that describes plans to meet and/or go beyond the Municipal Permit requirements has been interwoven throughout this document.

The primary goal of this inter-jurisdictional effort is to positively affect the water resources of the San Diego Bay watershed while balancing economic, social, and environmental constraints. The following objectives have been identified in order to achieve the program goal:

1) Develop and/or expand methods to assess and improve water quality within the watershed
2) Integrate watershed principles into land use planning
3) Enhance public understanding of sources of water pollution
4) Encourage and develop stakeholder participation

The *San Diego Bay Watershed URMP* has been developed and authored by the nine Copermittees identified above with jurisdictional boundaries within the San Diego Bay watershed. The *San Diego Bay Watershed URMP* is based upon the Model Watershed URMP documents prepared by the various Copermittee/Project Clean Water working groups to ensure regional consistency, but has been tailored specifically to the San Diego Bay watershed. The document is divided into three main parts: the Introduction and Watershed Description; a Water Quality Assessment; and a Plan of Action. These main parts are further divided into sections that coincide with Municipal Permit requirements.

1.2 Watersheds

A watershed is considered to be all the area above and below ground that drains into a particular water body, such as a stream, river, lake, reservoir, wetland, estuary, bay, ocean, or aquifer. Watersheds come in all shapes and sizes and cross jurisdictional, municipal, county, state, and national boundaries. The delineation of a watershed, or drainage area, depends on the scale of reference. Small watersheds may be combined into larger watersheds, and large watersheds may be divided into sub-watersheds or hydrologic units (HUs), that drain to specific water bodies or features. Watershed boundaries follow the major ridgelines around river channels and meet where the water flows out of the watershed, usually the mouth of a stream or river (see Figure 1-1).

In San Diego County, all waterways west of the Peninsular Range Mountains ultimately reach the Pacific coast. While watersheds can be large or small, every stream, tributary, or river has an associated watershed.

Most land management activities have traditionally been based on the jurisdictional limits of participating institutions including cities, counties, and states. While this may be practical from a legal and/or budgetary perspective, this jurisdictionally based division of land management has limited applications when considering environmental processes at a regional or watershed level. Watershed-level planning, on the other hand, makes sense for water quality management as watersheds represent geographic units of hydrological processes. In general, the concept of watershed management considers a watershed to be the fundamental organizing unit for protecting the wildlife, plant life, aquatic life, and other environmental assets of the system (Terrene Institute, 1996). Watersheds are "readily identifiable landscape units that integrate terrestrial, aquatic, geologic, and atmospheric processes" (Clements et al., 1996). Watershed management practices can provide an integrated approach to protect water quality.

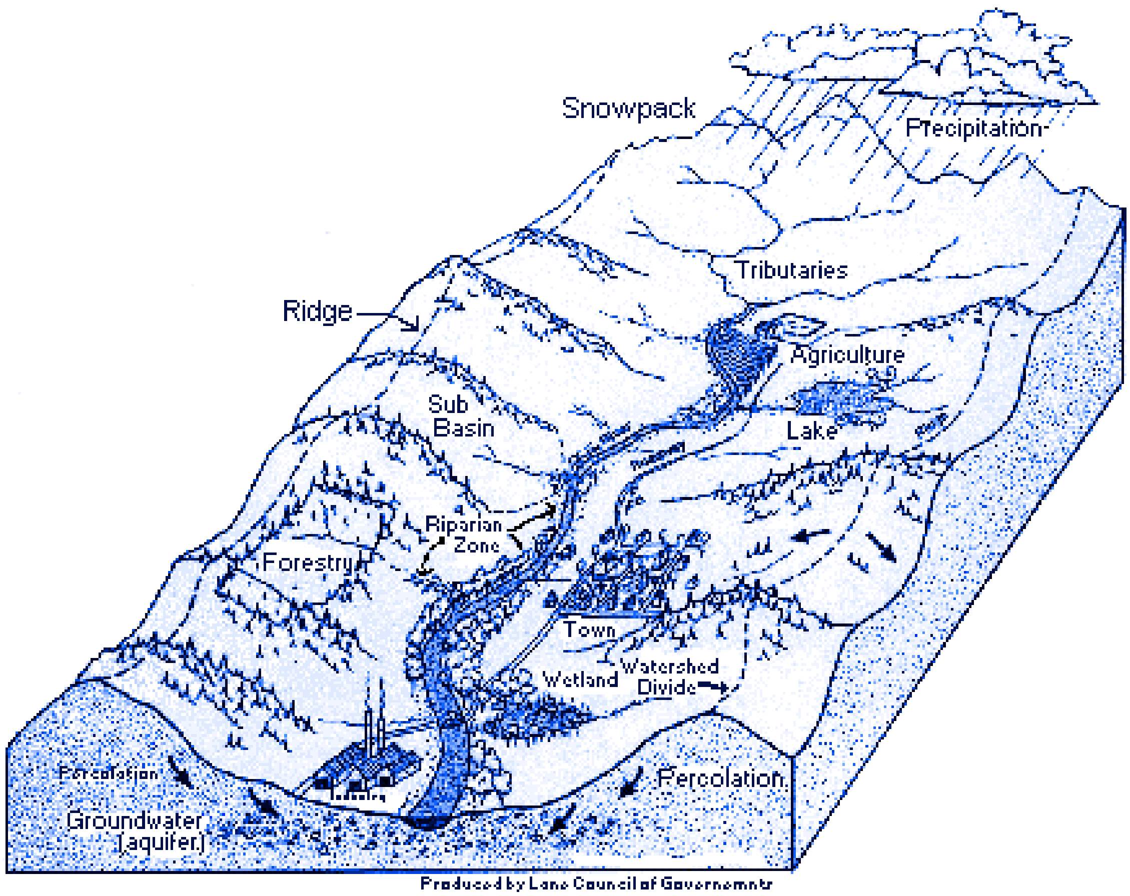

Figure 1-1. Typical Watershed

Source: U.S. EPA, Office of Wetlands, Oceans & Watersheds. http://www.epa.gov/OWOW/.

1.3 Urban Runoff and Water Quality Impacts

Because water moves downstream in a watershed, any activity that affects water quality, quantity, or rate of movement at one location can affect the watershed and receiving waters at downstream locations. Before reaching a stream, surface runoff accumulates from the highest points in a watershed and flows downhill across lawns, rooftops, parking lots, and roads, picking up many constituents along the way that pollute our rivers and beaches. For this reason, everyone living or working within a watershed needs to contribute to ensure the health of the watershed.

Pollutants carried in urban runoff can cause both short-term and long-term adverse water quality impacts to our local water bodies. These pollutants often settle into the sediment and impact the benthic, or bottom-dwelling, biological communities. As the human population within a watershed increases, the volume of urban runoff and the associated pollutants also tend to increase.

Urban runoff has two major sources: runoff from rainstorm events and runoff from other sources such as irrigation over-spray, foundation and footing drains, cooling condensate, and residential car washing. Pollutants, such as fertilizers and pesticides, motor oil and antifreeze, sediment, heavy metals, bacteria, and viruses that accumulate on paved (impervious) surfaces are easily picked up by runoff and flow downstream via the stormwater conveyance system (or storm drain system) to our local streams, rivers, lakes, and bays. The storm drain system is not connected with the sanitary sewer system, and therefore, urban runoff is not sent to any kind of treatment plant before being discharged to San Diego's creeks, bays, and beaches.

Urbanization causes significant adverse impacts on the quality of surface and ground waters in two ways: (1) by increasing the types and amounts of pollutants generated by human activities in a watershed; and (2) by reducing the volume of water that percolates into the soil. An increase in impervious surface decreases the amount of surface area available to allow water to infiltrate into the ground and thereby increases the amount of runoff to surface waters. In addition, the increase in runoff volumes caused by urbanization can overwhelm the functional capacities of other natural systems. For example, in addition to providing habitat for numerous plants and animals, wetlands can also provide natural water treatment by acting to filter and remove pollutants before stormwater and urban runoff enters streams, rivers, bays, and estuaries. The removal of pollution by wetlands improves the quality of water and associated wetlands. Urbanization cannot only reduce the amount of wetlands available, but can overwhelm the treatment capacities of those that remain.

Typical pollutants from urban runoff, their impacts, and their primary sources, are shown in Table 1-1.

Table 1-1 TYPICAL URBAN RUNOFF POLLUTANTS AND SOURCES

Pollutant	Impacts	Source
Heavy metals (such as chromium, copper, lead, mercury, nickel, and zinc)	Bioaccumulation, birth defects, and reproductive harm (animals), toxicity	Motor vehicles and equipment, outdoor material storage
Motor oil, antifreeze	Toxicity, oxygen depletion, aesthetic impacts	Motor vehicles and equipment, outdoor material storage
Grease	Toxicity, oxygen depletion, aesthetic impacts	Restaurants and households
Household toxins (paint, cleaners and solvents, fertilizers and pesticides)	Toxicity	Activities conducted outdoors; outdoor material storage
Sediment	Turbidity, reduced light penetration, potential for adsorbed pollutants, may act as pollutant transport mechanism	Graded areas left unplanted; channels eroded by increased volume and velocity of runoff
Nutrients (such as nitrates and phosphates)	Eutrophication (algal blooms), oxygen depletion	Fertilizers, detergents, and soaps.
Bacteria and other pathogens	Gastrointestinal illness, upper respiratory illness, skin rash, ear infections	Pet wastes, rotting leaves, sewer leaks

1.4 Summary of Municipal Stormwater Permit Requirements

The Federal Clean Water Act (CWA) Section 402 prohibits the discharge of pollutants into waters of the United States from any point source without a National Pollution Discharge Elimination System (NPDES) permit. The NPDES program initially focused on point source discharges of municipal and industrial wastewater, in 1983, the

US Environmental Protection Agency (EPA) reported in a summary of the Nationwide Urban Runoff Program (NURP) that urban stormwater was one of the primary causes of water quality impairment across the nation. The US EPA used the authorities of the CWA to adopt regulations for urban runoff and stormwater.

In November 1990, under Phase I of the urban runoff management strategy, the US EPA published NPDES permit application requirements for municipal, industrial, and construction stormwater discharges.

Municipalities were required to develop and implement an urban runoff management program (URMP). The municipal URMPs addressed activities to reduce pollutants in urban runoff and stormwater discharges from municipal stormwater conveyance systems. Unlike the numeric effluent limits established for industrial and commercial activities, the US EPA established narrative effluent limits for urban runoff from municipal activities, including the requirement to implement appropriate Best Management Practices (BMPs) to the maximum extent practical (MEP).

1.4.1 State of California NPDES Permit Programs

In California, the State Water Resources Control Board (SWRCB) and its Regional Water Quality Control Boards (RWQCBs) administer the NPDES permit program. In California, industrial and construction activities subject to NPDES regulations must obtain coverage under statewide general industrial and construction stormwater NPDES permits issued by the SWRCB.

The RWQCBs implement the municipal urban runoff NPDES permit program. The RWQCBs generally issue area-wide permits for urban areas that are considerable sources of pollutants or contribute to water quality standard violations. Regardless of population, the area-wide permits cover all municipalities within the defined urban area.

1.4.2 San Diego Municipal Permit

In 1990, under authority of the CWA, but prior to finalization of the NPDES Phase I regulations, the San Diego RWQCB issued its first municipal permit for the San Diego region (Order 90-42 – the “Municipal Permit”). The Municipal Permit named the 18 municipalities, the County of San Diego, and the San Diego Unified Port District as Copermittees.

More recently, on February 21, 2001, the SDRWQCB adopted Order No. 2001-01, NPDES Permit #CAS0108758. This Order represents the second Municipal Permit issued to the San Diego County Copermittees. The Municipal Permit specifies the waste discharge requirements for discharges of urban runoff from the Municipal Separate Storm Sewer Systems (MS4s or storm drain system) draining the watersheds of the Copermittees.

Municipal Permits seek to ensure that the beneficial uses of receiving waters are protected. Beneficial uses are defined as the uses of water necessary for the survival or well being of people, plants, and wildlife. Beneficial uses include surfing at a local beach, fishing in a creek or stream, or just taking a pleasurable walk along a scenic waterfront. Municipal stormwater NPDES permits contain requirements to achieve numeric and narrative water quality objectives that are established to protect beneficial uses. Water quality objectives are defined as constituent concentrations, levels, or narrative statements, representing a quality of water that supports the most sensitive beneficial uses that have been designated for a water body.

The Municipal Permit outlines the individual responsibilities of the Copermittees including, but not limited to, the implementation of:

- Management programs
- BMPs
- Monitoring programs

Each Copermittee is required to implement the requirements of the Municipal Permit across two broad levels of responsibility. Copermittees have responsibility for the water quality impacts of urbanization within (1) their jurisdiction and (2) their watershed(s). The Municipal Permit reflects these two broad levels of responsibility, in that it requires implementation of comprehensive URMPs, memorialized though Urban Runoff Management Plans, at both jurisdictional and watershed levels.

All the Copermittees within the San Diego Bay watershed have completed their *Jurisdictional Urban Runoff Management Program (JURMP)* documents and are in the process of implementing broad water pollution prevention programs within their respective jurisdictions. The jurisdictions are also committed to finding creative and effective ways to improve the water quality of the receiving waters of the San Diego Bay watershed.

The *San Diego Bay Watershed URMP* document was prepared in accordance with the Municipal Permit requirements in Section L. The document contains an Introduction and Watershed Description, an Assessment of Water Quality & Identification of Problems, a Plan of Action, a Summary and Conclusions, and the signed certified statement required by the Permit. The document discusses the components listed below as required by Municipal Permit Section L:

L.1.a.(1)	Completed watershed map
L.1.a.(2)	A water quality assessment (and discussion of watershed monitoring as needed)
L.1.a.(3)	Prioritization of water quality problems
L.1.a.(4)	Recommended activities (short and long term)
L.1.a.(5)	Individual Copermittee implementation responsibilities and time schedules for implementation
L.1.a.(6)	A description of watershed public participation mechanisms
L.1.a.(7)	A description of watershed education mechanisms
L.1.a.(8)	A description of the mechanism and implementation schedule for collaboration on watershed-based land use planning
L.1.a.(9)	A strategy for assessing the long-term effectiveness of the Watershed URMP

Section 2: Watershed Description

2.1 San Diego Bay Watershed

The *Water Quality Control Plan for the San Diego Basin* (Basin Plan, 1994) prepared by the RWQCB defines the San Diego Bay watershed as being comprised of three sub-watersheds (or hydrological units – HUs), namely: the Pueblo San Diego sub-watershed; the Sweetwater sub-watershed; and the Otay sub-watershed (See Figure 2-1). The San Diego Bay watershed encompasses a 415 square mile area that extends easterly from the San Diego Bay for more than 50 miles to the Laguna Mountains. The watershed lies at sea level at San Diego Bay and reaches a maximum elevation of approximately 6,000 feet above sea level at the eastern boundary. The majority of the watershed land area generally lies north of the border with Mexico and south of Interstate 8. The headwaters of the watershed begin in the unincorporated area of the County and then transect all or portions of seven cities, namely San Diego, National City, Chula Vista, Imperial Beach, Coronado, Lemon Grove, and La Mesa. Table 2-1 indicates the size of the San Diego Bay watershed, the size and percentage of the whole for each of the three individual sub-watersheds, as well as the percentage of land each municipality has within the San Diego Bay watershed and within the three individual sub-watersheds. The major watercourses feeding San Diego Bay include the Sweetwater River, the Otay River, Chollas Creek, Paleta Creek, Paradise Creek, and Switzer Creek.

San Diego Bay is the largest estuary in San Diego County and has been extensively developed as a port. It covers 10,532 acres of water and 4,419 acres of tidelands. Only seventeen to eighteen percent (17 to 18%) of the original Bay floor remains undisturbed by dredge or fill. Dams and extensive use of groundwater in the Sweetwater and Otay Rivers has reduced the input from these rivers to the Bay by seventy-six percent (76%). The majority of freshwater input to the Bay is from surface runoff from urban areas and intermittent flow from rivers and creeks during rain events. There are over 200 storm drains that discharge into San Diego Bay.

The San Diego Bay watershed contains a diverse assemblage of natural communities. Pine forests and oak woodlands are found in the mountains that form the headwaters of the Sweetwater and Otay Rivers. These forests are managed primarily for recreation and preservation, with campgrounds, off-road biking and hiking trails, and scenic overlooks. The Cleveland National Forest and Cuyamaca Rancho State Park are other

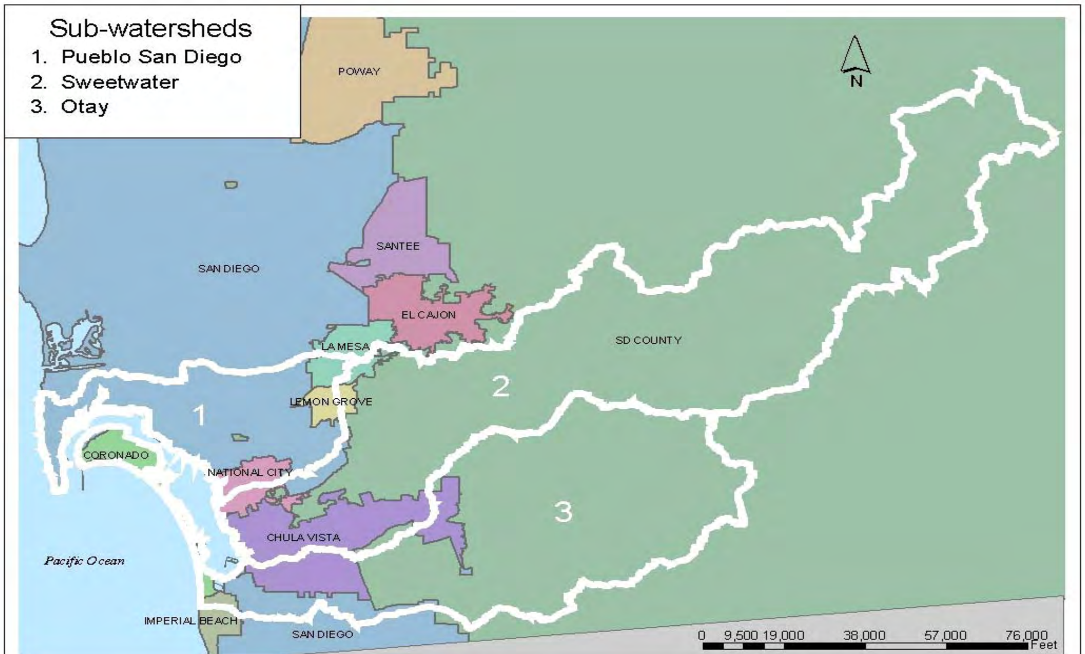

Figure 2-1 Sub-watersheds and Jurisdictional Boundaries of the San Diego Bay Watershed

Table 2-1 Jurisdictional Breakdown of San Diego Bay Watershed (By Area)

Watershed	Size (acres)	Percent (%)	Jurisdiction (%)								
			Chula Vista	Coronado	La Mesa	Lemon Grove	Imperial Beach	National City	San Diego	Unincorporated	Port of San Diego
San Diego Bay	**282,632**	**100**	**10.8**	**1.7**	**1.0**	**0.9**	**0.2**	**1.6**	**13.1**	**69.8**	**0.9**
Sub-watershed											
Pueblo San Diego	36,061	12.8			4.5	4.6		7.0	83.6		0.3
Sweetwater	148,038	52.4	8.9		0.8	0.6		1.2	1.4	86.6	0.5
Otay	98,533	34.9	17.6	5.0			0.7	0.1	6.7	69.7	0.2

Source: SANDAG, Watersheds of the San Diego Region, SANDAG INFO March-April 1998. Acreage for Port of San Diego jurisdiction was derived by a GIS application that included "Hydrologic Basins and Watersheds" and "Cities" layers provided by SANDAG, combined with the Port's Parcel Boundary. These layers were analyzed to estimate the total area managed by the cities, the County and the Port, for each sub-watershed.

public lands found in the watershed. Grassland meadows in these areas provide vegetation for wildlife, horses, and cattle. In the central part of the watershed, riparian vegetation containing willow, cottonwood, and sycamore trees provides habitat for the endangered least Bell's vireo. Hillsides along the river are covered with dense growths of chaparral vegetation and coastal sage scrub vegetation. Coastal sage scrub in this area provides habitat for one of the largest known populations of the threatened California gnatcatcher. In the western part of the watershed, the confluence of the Sweetwater River and the San Diego Bay forms a coastal salt marsh and brackish marsh. These marshes provide habitat for the light-footed clapper rail, the western snowy plover, Belding's savannah sparrow, and brown pelicans. Ninety percent (90%) of the original salt marshes and fifty percent (50%) of the original mudflats around San Diego Bay have been filled or dredged for development. The endangered California least tern and the threatened green sea turtle are just two of the many species that find suitable habitat in and around San Diego Bay itself.

2.2 Pueblo San Diego Sub-watershed

The Pueblo San Diego sub-watershed encompasses an area of approximately 60 square miles with no central stream system. San Diego River watershed borders it to the north and the Sweetwater River sub-watershed borders it to the south (Figure 2-2). The major population center is the City of San Diego.

2.2.1 Specific Drainage

The *Basin Plan* identifies the Pueblo San Diego sub-watershed as the smallest of the three San Diego Bay sub-watersheds, covering just over 36,000 acres. It is comprised of three hydrologic areas: Point Loma, San Diego Mesa, and National City. Major water features include Chollas Creek, Paleta Creek, and San Diego Bay. The majority of the water from the Pueblo San Diego sub-watershed drains to San Diego Bay, although a portion of the Point Loma area drains directly to the Pacific Ocean.

2.2.2 Sub-watershed Land Use Inventory

Table 2-2 depicts the existing land use in the Pueblo San Diego sub-watershed, based on Year 2000 data from the San Diego Association of Governments (SANDAG). Ninety-two percent (92%) of the existing land use is primarily urban. Fifty-three percent (53%) of the developed area is residential. The majority of the land is privately owned with only a small percentage owned by the government. Most of the sub-watershed falls under

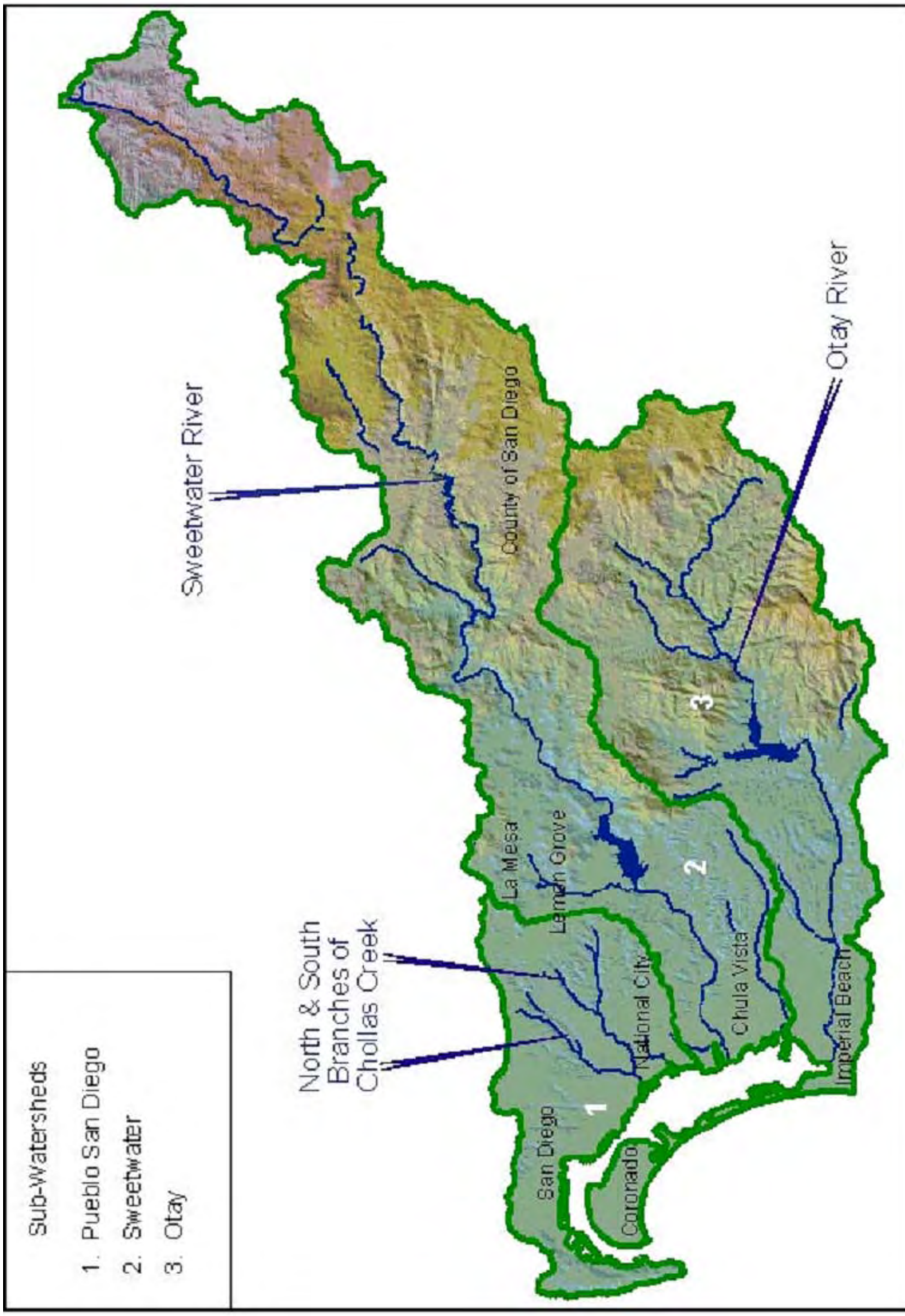

Figure 2-2 Major Watercourses with the Sub-watersheds of the San Diego Bay Watershed

the jurisdiction of the City of San Diego (83.6%). Other jurisdictions include La Mesa, Lemon Grove, National City, and a small percentage of the County of San Diego. Given the extent of existing development, there is little new development forecasted for the Pueblo San Diego sub-watershed over the next 15 years. Current and projected land uses suggest that this sub-watershed should focus on developing BMP's and public education efforts directed at urban runoff from residential and retail/office areas.

The Pueblo San Diego sub-watershed is the most developed and most densely populated sub-watershed in the San Diego Bay watershed. The population in the sub-watershed is expected to reach over 577,000 by the year 2020 (see Table 2-3).

Table 2-2 Land use inventory for the Pueblo San Diego Sub-watershed

Pueblo San Diego	Acreage	As Percentage of Sub-watershed
AGRICULTURE	17	0
COMMERCIAL AND OFFICE	2,845	8
INDUSTRIAL	1,174	3
PARKS AND RECREATION	3,063	8
PUBLIC FACILITIES AND UTILITIES	7,109	20
RESIDENTIAL	19,284	53
UNDEVELOPED	2,479	7
WATER	96	0
Total	36,066	100

Source: Sources include SANDAG Year 2000 digital imagery and City of San Diego Water Utilities digital orthophotos, jurisdictional land use data and various secondary sources used to verity land use interpretations. Data tabulated by SANDAG as a courtesy to San Diego Copermittees.

Table 2-3 Expected Population Growth in the Pueblo San Diego Sub-watershed

Sub-watershed	1990	2000	2010	2020	2030
Pueblo	454882	478535	540344	577460	623381
City Name					
LA MESA	16810	17318	18079	18942	19620
LEMON GROVE	15857	16579	18028	19216	19564
NATIONAL CITY	38191	36521	37848	40736	42111
SAN DIEGO	384024	408117	466389	498566	542086

Source: This table was generated from information provided by SANDAG staff for the San Diego Copermittees. Data sources: 1990 Census and SANDAG 2020 Cities/County Forecast (base year 1995). It is anticipated that this information will be updated in the future with the assistance of SANDAG using the 2000 Census and the 2030 Cities/County Forecast.

2.3 Sweetwater Sub-watershed

The Sweetwater sub-watershed encompasses approximately 230 square miles, with the Sweetwater River comprising the central drainage system. As shown in Figure 2-2, the Pueblo San Diego sub-watershed is located to the north of the Sweetwater sub-watershed and the Otay sub-watershed is located to the south. The most urbanized parts of the Sweetwater sub-watershed include portions of the City of Chula Vista, City of Lemon Grove, National City, and the unincorporated communities of Spring Valley and Rancho San Diego.

2.3.1 Specific Drainage

The *Basin Plan* identifies the Sweetwater sub-watershed as the largest of the three sub-watersheds of the three San Diego Bay sub-watersheds. The Sweetwater sub-watershed encompasses over 148,000 acres. The sub-watershed includes three hydrologic areas: Lower Sweetwater, Middle Sweetwater, and Upper Sweetwater. Major water bodies within the Sweetwater sub-watershed include the Sweetwater River, Sweetwater Reservoir, Loveland Reservoir, and San Diego Bay, all of which support important wildlife habitat, and provide public recreational opportunities. The Sweetwater and Loveland Reservoirs store a municipal water supply.

2.3.2 Sub-watershed Land Use Inventory

Table 2-4 shows the existing land use in the Sweetwater sub-watershed, based on Year 2000 data from SANDAG. The single-most predominant land use within the sub-watershed is vacant/undeveloped land (45%), with parks/recreation (24%) and residential uses (22%) being the next highest land use categories. The County of San Diego has land use authority for more than 86.6% of the Sweetwater sub-watershed. The cities of Chula Vista, La Mesa, Lemon Grove, National City, and San Diego, and the San Diego Unified Port District govern the land uses in the remaining portion of the sub-watershed. The Cleveland National Forest, Cuyamaca Rancho State Park, and the unincorporated communities of Jamul, Pine Valley, Descanso, Alpine, and the Viejas Indian Reservation occupy much of the undeveloped land in the Sweetwater sub-watershed. Most of the land within the Sweetwater sub-watershed is held in private ownership; local, state, and federal government ownership; or it is land controlled by Indian tribes.

The current population of the sub-watershed is approximately 300,000, and is expected to grow approximately 368,000 by the year 2020 (Table 2-5). This is the lowest expected growth rate for any of the three sub-watersheds in the San Diego Bay watershed.

Table 2-4 Land use inventory for the Sweetwater Sub-watershed

Sweetwater	Acreage	As Percentage of Sub-watershed
AGRICULTURE	4,631	3
COMMERCIAL AND OFFICE	1,735	1
INDUSTRIAL	1,265	1
PARKS AND RECREATION	34,953	24
PUBLIC FACILITIES AND UTILITIES	4,913	3
RESIDENTIAL	31,896	22
UNDEVELOPED	67,217	45
WATER	1,449	1
Total	148,058	100

Source: Sources include SANDAG Year 2000 digital imagery and City of San Diego Water Utilities digital orthophotos, jurisdictional land use data and various secondary sources used to verity land use interpretations. Data tabulated by SANDAG as a courtesy to San Diego Copermittees.

Table 2-5 Expected Population Growth in the Sweetwater Sub-watershed

Sub-watershed	1990	2000	2010	2020	2030
Sweetwater	264952	302838	342015	368196	390642
City Name					
CHULA VISTA	81830	108272	123147	130265	136965
LA MESA	6816	7942	8352	8655	8715
LEMON GROVE	8127	8339	8928	9833	10444
NATIONAL CITY	16082	17739	18774	21118	25319
SAN DIEGO	33494	33521	34446	35159	40124
UNINCORPORATED	118603	127025	148368	163166	169075

Source: This table was generated from information provided by SANDAG staff for the San Diego Copermittees. Data sources: 1990 Census and SANDAG 2020 Cities/County Forecast (base year 1995). It is anticipated that this information will be updated in the future with the assistance of SANDAG using the 2000 Census and the 2030 Cities/County Forecast.

2.4 Otay Sub-watershed

The Otay sub-watershed encompasses approximately 180 square miles, with the Otay River comprising the central drainage system (Figure 2-2). The Sweetwater sub-watershed is located to the north of the Otay sub-watershed and the Tijuana Watershed is located to the south. The major population centers for this sub-watershed include the City of San Diego, City of Imperial Beach, and the City Chula Vista. A large percentage of the water within the Otay sub-watershed is actually imported from Morena and Barrett Reservoirs, which are physically located in the Tijuana watershed. The Dulzura flume delivers water from the Barrett Reservoir to Dulzura Creek in the Otay sub-watershed. Morena Reservoir is connected to Barrett Reservoir by Cottonwood Creek. Water in Dulzura Creek drains into the Lower Otay Reservoir which, is owned and operated by the City of San Diego.

2.4.1 Specific Drainage

The *Basin Plan* identifies the Otay sub-watershed as the second largest of the three San Diego Bay sub-watersheds. The Otay sub-watershed consists of approximately 98,500 acres. The sub-watershed consists of three hydrologic areas: Coronado, Otay, and Dulzura. Major water bodies include the Upper and Lower Otay Reservoirs, Otay River, and San Diego Bay. The two major reservoirs in the sub-watershed supply water, important wildlife habitat, and recreational opportunities.

2.4.2 Sub-watershed Land Use Inventory

Based on Year 2000 data from SANDAG, more than fifty-one percent (51%) of the land use within the Otay sub-watershed is vacant/undeveloped (Table 2-6). The remaining land uses consist of a mix of parks, open space, agriculture, and urban uses. A large portion of the vacant/undeveloped land is constrained from development (59%). The majority of the remaining undeveloped areas are slated for residential development. Over sixty-nine percent (69%) of the sub-watershed is unincorporated area. The thirty-one percent (31%) is divided between the following jurisdictions: the cities of Chula Vista, Coronado, Imperial Beach, National City, and San Diego, and the San Diego Unified Port District. Land ownership within the Otay sub-watershed is predominantly private with a small percentage of local, state, and federally owned lands.

The Otay sub-watershed is one of the three least populated sub-watersheds in San Diego County, with a population of approximately 153,000 people. This population is expected to increase to approximately 252,000 by the year 2020 (Table 2-7).

2.5 Watershed Mapping

Appendix B provides accurate maps of the watershed that identify: all receiving waters (including the Pacific Ocean); Clean Water Act Section 303(d) impaired receiving waters (including the Pacific Ocean); land uses; MS4s; major highways; jurisdictional boundaries; and, inventoried commercial, construction, industrial, municipal sites and residential areas.

Table 2-6 Land use inventory for the Otay Sub-watershed

Otay	Acreage	As Percentage of Sub-watershed
AGRICULTURE	2,350	2
COMMERCIAL AND OFFICE	758	1
INDUSTRIAL	1,721	2
PARKS AND RECREATION	26,097	26
PUBLIC FACILITIES AND UTILITIES	5,753	6
RESIDENTIAL	10,163	10
UNDEVELOPED	50,663	51
WATER	1,042	1
Total	98,546	100

Source: Sources include SANDAG Year 2000 digital imagery and City of San Diego Water Utilities digital orthophotos, jurisdictional land use data and various secondary sources used to verity land use interpretations. Data tabulated by SANDAG as a courtesy to San Diego Copermittees.

Table 2-7 Expected Population Growth in the Otay Sub-watershed

Sub-watershed	1990	2000	2010	2020	2030
Otay	134007	153177	221114	252726	276610
City Name					
CHULA VISTA	53380	65284	121185	139264	145699
CORONADO	25941	24100	25399	25544	25536
IMPERIAL BEACH	13628	13956	14403	15882	17664
SAN DIEGO	35760	38797	46483	48708	53459
UNINCORPORATED	5298	11040	13644	23328	34252

Source: This table was generated from information provided by SANDAG staff for the San Diego Copermittees. Data sources: 1990 Census and SANDAG 2020 Cities/County Forecast (base year 1995). It is anticipated that this information will be updated in the future with the assistance of SANDAG using the 2000 Census and the 2030 Cities/County Forecast.

The watercourse, water body, and water-related features throughout the San Diego Bay watershed are shown on Plate 1. The remaining map features required by the Municipal Permit (namely: the major highways; the jurisdictional boundaries; and the inventories) are presented on Plate 2. While Section J.2.a of the Municipal Permit states in part that each Copermittee provide an accurate map that inventories commercial, construction, municipal, and industrial facilities, this type of information is not readily available in a geodatabase format from all the Copermittees within the San Diego Bay watershed. The inventory information herein is presented as land use categories.

Section 3: Water Quality Assessment

3.1 Approach

An assessment of existing water quality data provides an initial understanding of the current condition of the San Diego Bay watershed. The Municipal Permit does not provide a definition of a "major water quality problem." For the sake of consistency in all the Watershed URMPs drafted throughout San Diego County, this term is interpreted to mean a specific parameter as opposed to an issue (e.g. sedimentation, not "construction sites"). This definition allows for a more scientific approach to source identification and prioritization of problems. The methodology for identifying the principal water quality problems within this watershed is presented herein.

For purposes of the San Diego Bay watershed water quality assessment, a major water quality problem is based on evaluation of data for the following parameters:

- Toxic substances (metals, diazinon, organics, etc.)
- Nutrients (nitrogen, phosphorous, etc.)
- Bacteria/Pathogens (total coliform, fecal coliform, etc.)
- Sedimentation (eroded soils, silts, etc.)
- General physiochemical characteristics (temperature, pH level, etc.)

Specific constituents of concern likely to cause and/or contribute to the degradation or impairment of a receiving water body are identified when existing data can clearly support such linkages. The following watershed assessment under the context of this watershed URMP is primarily focused on water quality parameters. The Copermittees of the San Diego Bay watershed recognize that there are many other issues that are generally part of a typical watershed assessment, such as invasive species, wildlife, and habitat protection. These issues are often coupled with water quality and will be addressed herein whenever practical.

3.2 Water Quality Assessment Factors

The data evaluation is generally based on the following factors: (1) identification of the frequency, magnitude, and duration of water quality reference value exceedances; (2) a review of the available historical data; (3) a statistical analyses of the data; (4) use of a weight-of-evidence approach; and (5) a comparison to modeled pollutant loads.

A historical record that includes numerous years of data collected at each Mass Loading Station (MLS) is necessary to accurately perform trend analysis and identify persistent water quality problems. Additional data collection and validation may be needed to develop an effective understanding of water quality in the San Diego Bay watershed. The assessment developed in this the initial *San Diego Bay Watershed URMP* document should be considered to have provided a "targeted list of Constituents of Concern (COC)" that will be validated in future years.

Statistical analyses are used to evaluate whether the data indicates a trend of water quality reference-value exceedances or possible one-time occurrences. Such trends will be considered indicative of potential water quality problems.

The weight-of-evidence approach or triad-decision matrix provides a consistent and scientific way to analyze data. The three elements making up the weight-of-evidence triad are chemistry, toxicity, and stream bioassessment (analysis of the benthic community). Chemistry and toxicity provide an indication of both the pollutant load during a storm event and the potential impacts to aquatic organisms, respectively. The stream bioassessment provides information related to the ecological health of the watershed, as well as the quality and condition of the physical habitat. This weight-of-evidence approach will be used to direct the efforts of future monitoring programs giving Copermittees a useful scientific interpretation on which to base water quality decisions.

3.2.1 Data Review

The data assessment considers all applicable programs, regulatory requirements, and the data that has been collected to best establish an accurate assessment of the water quality within the San Diego Bay watershed.

The following information was evaluated as part of this assessment:

1. Measured Pollutants:
    a. Historic data from mass loading stations and land use stations
    b. Current data from 2001-02 Copermittee Wet weather monitoring program
    c. Other available information (e.g. special studies, dry weather information)

2. Land Use Modeled (Expected) Pollutants:
    a. Pollutants of concern for specific land uses
    b. Expected high pollutant loads from specific land uses

3. The approved List of Section 303(d) Water Quality Limited Segments within the San Diego Bay watershed

4. The water quality reference values associated with the designated beneficial uses of the major water bodies in the watershed

3.3 Data and Pollutants

Monitoring data is probably the most useful information for assessing the pollutants within a watershed. This data can indicate elevated pollutant levels, toxicity problems, or ecological impacts that could be affecting both upstream and downstream receiving waters. Monitoring data can also be used for long-term trend analysis that may indicate whether pollutant loads are increasing or decreasing. The assessment of water quality problems provided below takes into account the pollutants that are measured in both present and historical stormwater monitoring data, as well as other similarly related monitoring programs, to provide the most complete picture of water quality within the San Diego Bay watershed. The following information sources were reviewed as part of this initial assessment of water quality in the San Diego Bay watershed.

3.4 Historic Stormwater Monitoring Data

Stormwater monitoring has been conducted throughout San Diego County by the Copermitees since 1993. Initially, the stormwater monitoring program was designed to provide preliminary estimates of pollutant loads in order to assist in the development of stormwater management priorities. Several sites were selected to identify the concentration of pollutants that resulted from the activities associated with specific land uses. Once enough data had been collected to create a model, the Copermittee stormwater monitoring program shifted to a reliance on Mass Loading Stations (MLS) in order to represent runoff (pollutant loading) for typical storm events in the major watersheds. The criteria for selecting the MLSs included: representation of populated urban areas; inclusion of rivers that reached further upstream for a wider characterization of the watershed; and inclusion of receiving waters that drain into the bays or coastal ocean waters. These criteria were intended to assist in evaluating long-term changes in water quality and pollutant loads within entire watersheds.

3.4.1 Data Limitations

The historic data has several limitations, notably:

1) Several stations, which were initially established to collect the land use loading data, have since been eliminated from the Copermittee stormwater monitoring program.

   Data from these stations provides only a partial picture of the water quality at the specified location because these locations are no longer monitored and there is no way of knowing if previously identified problems still exist or if they are increasing or decreasing.

2) Detection limits have changed throughout the course of the Copermittee stormwater monitoring program.

   There are several instances where the detection limits in historical data may actually exceed the current reference value. The change in detection limits over time could be misleading and result in the inappropriate conclusion that certain constituents do not exist in a particular watershed. Thus, an adequate assessment cannot be made. For example, during the first years that Diazinon and Chlorpyrifos were analyzed, their detection limits were higher than the established reference value. Thus, an adequate assessment of their impact on water quality cannot be made, since the chemicals might be present at concentrations above the reference value but below the ability of the laboratory to detect them.

3) The initial monitoring program (and consequent sampling sites) was created for a countywide assessment (of land use pollutant loads) and not for reporting on a watershed level.

   While the data from the historic stormwater monitoring program can be compiled using data from sampling stations that are within the San Diego Bay watershed, the data was actually collected under a study design that addressed the area of the entire county, and thus assessment of the water quality in an individual watershed may be misleading.

Despite these limitations, historic stormwater monitoring data can still provide insight into current water quality problems in the San Diego Bay watershed, if used correctly. For example, the data may allow for long-term trend analysis. The San Diego Bay

Watershed Copermittees will take these limitations into consideration when formulating pollution prevention strategies and will assess historic stormwater monitoring data, along with other sources of information.

The historic sampling stations located within the San Diego Bay watershed are Bramson (initial land use evaluation stormwater monitoring program – land use), California St. (subsequent stormwater MLS monitoring program - MLS), Chollas Creek (MLS), Crosby (land use), Landis (land use), Otay (MLS), Proctor (land use), and Switzer Creek (MLS). It should be noted that of all these sites, only Chollas Creek is included in the current Copermittee Wet Weather Monitoring Program. All of the historic stormwater monitoring data relevant to the San Diego Bay watershed has been compiled from the *San Diego Region Previous Storm Water Monitoring Review and Future Recommendations Report* (MEC, 2001), and is summarized below. The data is presented in Appendix A.

3.4.2 Historic Land Use Monitoring Sites

As noted above, the land use monitoring sites were selected to characterize pollutant loads from specific land uses. Their purpose was twofold; to obtain measured pollutant concentrations and provide preliminary estimates of pollutant loads that could be used to establish stormwater management priorities (Kinetics Laboratories, 1994) and to characterize runoff discharges from small relatively homogenous drainages identified as representative of residential, commercial, and industrial land use activities (Kinetics Laboratories, 1995). These sites were removed from the monitoring program in 1998 once it was determined that there was sufficient data to model land use pollutant loads.

The Bramson site was located at the west end of Bramson Place, just east of Interstate 805 in the City of San Diego (Kinetics Laboratories, 1995). The drainage area is 41 acres and includes forty-nine percent (49%) commercial and fifty-one percent (51%) residential land uses. This site was selected to represent a commercial land use area (Kinetics Laboratories, 1995). Runoff from this site eventually discharges into Chollas Creek. The Bramson site was sampled from 1994 to 1998. Approximately eight storms were sampled, although the number of individual constituents analyzed for each event may vary. Concentrations for total copper, total zinc, and both total and fecal coliform repeatedly exceeded reference values. Dissolved copper, and dissolved zinc exceeded the acute aquatic life criterion, while dissolved copper, dissolved zinc, and dissolved lead exceeded the chronic aquatic life criterion. Semi-volatiles, total Kjeldahl nitrogen (TKN), and total petroleum hydrocarbons (TPH) showed repeated exceedances of reference values for their detectable results; however, it should be noted that even the detection limits for these constituents were also above the reference values. Both chemical oxygen demand (COD) and total suspended solids (TSS) exceeded reference values on occasion. It should be noted that the detection limits for PCBs and chlordane also exceeded the reference values.

The Crosby site was located on Crosby Street, southwest of Harbor Drive in the City of San Diego (Kinetics Laboratories, 1995). The drainage area is 118 acres, of which forty-eight percent (48%) is residential, forty-two percent (42%) industrial, and ten percent (10%) is commercial land uses. The site was selected (at the request of the RWQCB) to represent an industrial land use because it contained the highest percentage of industrial land use within the area (Kinetics Laboratories, 1995). Runoff from this site discharges directly into San Diego Bay. The Crosby site was included in the monitoring program from 1994 to 1998. Approximately 12 storm events were sampled, although the number of individual constituents analyzed for each event may vary. Concentrations for total copper, total zinc, and both total and fecal coliform repeatedly exceeded reference values. Dissolved copper exceeded the acute aquatic life criterion, while dissolved copper, dissolved zinc, and dissolved lead exceeded the chronic aquatic life criterion. COD, TKN, and TSS also indicated repeated exceedances of reference values. TPH exceeded the reference value for all detectable results; however, it should be noted that the detection limit was also above the reference value. Samples from the Crosby site were analyzed for semi-volatiles, however, only bis 2-ethylhexyl phthalate was detected at levels that exceeded the reference value. (Semi-volatile analysis is no longer included in the current Copermittee Wet Weather Monitoring Program). Biologic oxygen demand (BOD), Oil & Grease, and pH exceeded reference values on single event occurrences.

The Landis Street site was located on Landis Street, east of 40th Street in an older, lower income residential neighborhood within the City of San Diego (Kinetics Laboratories, 1995). This site discharges into Chollas Creek and then into San Diego Bay. The drainage includes 57 acres, and the site was selected to represent pollutant loads associated with residential land use. It was included in the monitoring program from 1994 to 1996. The Landis Street site was sampled for 4-5 storm events, although the number of individual constituents analyzed for each event may vary. Total copper, TPH, TKN, and both total and fecal coliform repeatedly exceeded the reference values. COD and TSS showed some elevated results on occasion. The semi-volatile constituent, bis 2-ethylhexyl phthalate, was present in levels that were more than doubled the reference value. Although samples were analyzed for pesticides and PCBs, the detection limits were above the reference values, and therefore, an assessment of the potential presence of these constituents at this site cannot be made.

The Proctor sampling station was located in Chula Vista near the intersection of Proctor Valley Road and Rolling Ridge Road (Kinetics Laboratories, 1994). This site has a total drainage area of 40 acres and was selected to characterize pollutants associated with construction activities. Runoff from this site eventually discharges into the Sweetwater River. The Proctor site was established during the initial year (1993) of the Copermittee stormwater monitoring program. It was only monitored during the 1993-1994 sampling program and was sampled for three storm events. This site was sampled for constituents typically associated with construction activities (i.e. TSS, turbidity, total dissolved solids (TDS), settleable solids (SS)). TSS was the only constituent that exceeded the water quality objective, and it did so for two of the three events.

3.4.3 Historic Mass Loading Stations

The initial Mass Loading Stations (MLS) were established to collect runoff from a larger portion of the watershed drainage area. These stations tended to be located in areas with high urban populations. They represented multiple land uses and were selected to best represent the varied land uses throughout the drainage areas.

The California Street MLS was located along California Street, an alley adjacent to the Southern Pacific Railroad tracks, one-half block south of Laurel Street and east of Lindbergh Field. The total drainage area is 648 acres, which represents fourteen percent (14%) of the total watershed in which it is located (Woodward-Clyde, 1998). This site was included in the program from 1996 to 2001. Approximately 14 storm events were sampled, although the number of individual constituents analyzed for each event may vary. Data indicates that total copper, TKN, both total and fecal coliform, and bis 2-ethylhexyl phthalate repeatedly exceeded the reference values. Total zinc, total chromium, BOD, and COD occasionally exceeded reference values. TSS exceeded the reference value approximately half of the time; however, the trend for the most recent years seemed to indicate that levels of TSS were declining. Dissolved copper and dissolved zinc exceeded the acute aquatic life criterion, while dissolved copper, dissolved zinc, and dissolved lead exceeded the chronic aquatic life criterion. Although dissolved lead had several elevated results, total lead exceeded the reference value only once. Diazinon concentrations were reported as ranging between 0.66 and 0.79ug/L (and it should be noted that the detection limit for these analyses was above the reference value).

The Switzer Creek MLS was located near the intersection of Imperial, National, and 12th Avenues in the San Diego Trolley Yard (Kinetics Laboratories, 1994). The drainage area contains 2,560 acres within a heavily populated urban area of central San Diego. It is characterized by residential (45%), open land (31%), and commercial (22%) uses (Kinetics Laboratories, 1994). This station was included in the monitoring program from 1993 to 1996. It was eliminated after 1996 because it was determined that the sampling location was tidally influenced (electrical conductivity measurements from storm events confirmed the presence of tidal intrusion). The Switzer Creek MLS was sampled for six storm events, although the number of individual constituents analyzed for each event may vary. Data indicates that TKN, total copper, total zinc, and both total and fecal coliform repeatedly exceeded the reference values. Occasionally, BOD exceeded the reference values, while COD, oil and grease, TPH, and surfactants had single event exceedances. Dissolved lead exceeded the chronic aquatic life criterion, while dissolved copper and dissolved zinc exceeded both the chronic and acute aquatic life criterion. The detection limits for PCBs, chlordane, and toxaphene were above the reference value, and therefore, an assessment of the potential presence of these constituents at this site cannot be made.

The Chollas Creek MLS is located near the intersection of 33rd Street and Durant Street, just east of the Durant cul-de-sac (Kinetics Laboratories, 1994). The sampling location lies in the north fork of Chollas Creek (which represents 55% of the 16,900 acre Chollas Creek drainage). This site was chosen to avoid the influences of tidal intrusion, which occurs in lower reaches of Chollas Creek (Kinetics Laboratories, 1994). This drainage area is highly urban, including sixty-four percent (64%) residential and seventeen percent (17%) commercial land uses (MEC, 2002). Chollas Creek has been, and continues to be included in the Copermittee stormwater monitoring programs since the programs first began in 1993. This provides the San Diego Bay watershed with a data history spanning almost ten years, which is the most extensive data set in the San Diego County region. Data has been compiled for 21 storm events at the Chollas Creek MLS, although the number of individual constituents analyzed for each event may vary. Data indicates that total copper, TKN, TSS, and bacterial indicators (total coliform, fecal coliform, and enterococcus) repeatedly exceeded reference values. Total lead, and total zinc, BOD, COD, and surfactants also exceeded reference values on some occasions. Total chromium and pH had only single sample exceedances throughout the course of the monitoring program. Dissolved lead exceeded the chronic aquatic life criterion while dissolved zinc exceeded both the chronic and acute aquatic life criterion. Concentrations of TPH repeatedly exceeded the reference value during the 1995-1996 monitoring year, the only year for which TPH was sampled. The detection limit for the diazinon analyses was 0.5ug/L, which is well above the 0.08ug/L reference value, making data interpretation difficult. There were two reportable values for diazinon of 0.53 and 0.75ug/L. Bis 2-ethylhexyl phthalate also exceeded the reference value on multiple occasions, but was removed from the monitoring program after 1998.

The Otay MLS was located on the southeast side of Beyer Boulevard, just past the south end of the Otay River Bridge (Kinetics Laboratories, 1994). The drainage area consisted of approximately 23,680 acres and contained light industrial and residential land uses. There was no data collected at the Otay station due to vandalism of the monitoring equipment and the subsequent decision not to replace it (Kinetics Laboratories, 1994).

3.5 Current Stormwater Monitoring Data

The Copermittees currently conduct stormwater monitoring programs in accordance with requirements in the Municipal Permit, Attachment B. Results of the previous wet weather season have been summarized in the *San Diego County Municipal Stormwater Copermittees 2001-2002 Urban Runoff Monitoring Report (Monitoring Report)* (MEC, November 2002). Portions of the report relevant to the San Diego Bay watershed are presented below.

Three (of the twelve countywide) MLSs initially scheduled for inclusion in the Copermittee Wet Weather Monitoring Program are located within the San Diego Bay watershed, specifically within Chollas Creek, Sweetwater River, and Otay River. A new Otay River MLS was established at the onset of the Wet Weather Monitoring Program, however, this site never experienced flow. It was determined that the hydrographic conditions within the Otay River drainage area would not produce adequate flow for sample collection. It should be noted that this site is recommended for removal from the remainder of the Wet Weather Monitoring Program and at this time there does not appear to be an alternate site planned for this portion of the San Diego Bay watershed.

The three storm events for the 2001-2002 wet weather season produced the following notable results for the San Diego Bay watershed MLS (see Table 3-1, which is also Table 5-13 in the MEC November 2002 report).

3.5.1 Chollas Creek MLS

The Chollas Creek MLS has been monitored continuously since 1993. (See historic data, section 3.4.3 above for a site description.) Again, Table 3.1 presents the data for the three storm events monitored at the Chollas Creek MLS during the 2001-2002 Wet Weather Monitoring Program. Concentrations of diazinon, chlorpyrifos, copper (total and dissolved), zinc (total), and turbidity at the Chollas Creek MLS exceeded reference values during all storm events (11/29/01, 2/17/02, and 3/8/02). Fecal coliform exceeded the designated REC-2 water quality standards during all three storm events. *The Basin Plan* does not provide REC-2 water quality standards for either total coliform or enterococcus, however, it should be noted that these constituents were elevated above reference values for beach water quality during all storm events as well. Concentrations of BOD exceeded the reference value during one storm event (2/17/02), while COD exceeded the reference value during two storm events (2/14/02 and 3/8/02). Constituents that exceeded reference values occasionally, but not during all storm events included total phosphorus (3/8/02), total chromium (3/8/02), and TSS (2/17/02 and 3/8/02).

As part of the *San Diego County Municipal Stormwater Copermittees 2001-2002 Urban Runoff Monitoring Report* (November 2002), MEC performed several types of statistical analyses on the Copermittee Wet Weather Monitoring program data. The statistical analyses included scatter plot, trend analysis, analysis of variance (ANOVA), and multivariate cluster analysis. These analyses give an indication of the potential problems within Chollas Creek. These analyses also allow for comparison of the Chollas Creek watershed to other San Diego County watersheds. The analyses produced the following relevant conclusions. Trend analyses indicate that nitrite and oil & grease levels in Chollas Creek have been increasing while lead has been decreasing. ANOVA results suggest that Chollas Creek tends to have higher concentrations of BOD, COD, copper, lead, zinc, oil & grease, diazinon, and enterococci, than the other MLS throughout San Diego County. ANOVA analysis also indicates that toxicity within Chollas Creek regularly exceeds the results of the other MLS in San Diego County. Cluster analysis results were similar to ANOVA suggesting that concentrations of measured COCs in Chollas Creek typically exceed those at the other MLS throughout San Diego County. Based on these statistical analyses, it appears that Chollas Creek is one of the most impacted watersheds in the county.

Toxicity tests indicated consistent toxicity to *Ceriodaphnia* (both chronic and acute) in Chollas Creek. Chronic toxicity (seven-day survival/reproduction) was observed during all three storms, while acute toxicity (96-hour) was observed during two storms. Acute toxicity was also evident in *Hyalella* (96-hour) during two of the three storm events. Stormwater from Chollas Creek did not appear to indicate acute toxicity to *Selenastrum*.

A summary of the data evaluation for the Chollas Creek MLS is presented in Table 3-2.

The Chollas Creek portion of the San Diego Bay watershed does not currently contain a bioassessment monitoring location. Therefore, at this time no assessment of potential benthic community impacts has been made within Chollas Creek.

Table 3-1. Constituents of concern measured in the San Diego Bay watershed area during the 2001-2002 Wet Weather Monitoring Program. (Based on Table 5-13 from the MEC November 2002 report.)

ANALYTE	UNITS	Reference Value	Source	San Diego Bay					
				Chollas 11/29/01	Chollas 02/17/02	Chollas 03/08/02	Sweetwater 02/17/02	Sweetwater 03/17/02	Sweetwater 04/25/02
General / Physical / Organic									
Electrical Conductivity	umhos/cm			155	310	242	3820	3430	2980
Oil And Grease	mg/L	15	USEPA Multi-Sector General Permit	5	10	8	1	1	1
pH	pH Units	6.5-8.5	Basin Plan	7.4	7.4	8	7.5	7.4	7.3
Bacteriological									
Enterococci	MPN/ 100 mL			170,000	110,000	220,000	300	16,000	9,000
Fecal Coliform	MPN/ 100 mL	400	Basin Plan	**30,000**	**23,000**	**70,000**	130	**500**	**11,000**
Total Coliform	MPN/ 100 mL			80,000	300,000	300,000	23,000	5,000	230,000
Wet Chemistry									
Ammonia As N	mg/L	0.025 (a)	Basin Plan	0.7	2.14	1.04	0.16	0.3	0.2
BOD	mg/L	30	USEPA Multi-Sector General Permit	27	**73.3**	29	2	14.2	4.7
Chemical Oxygen Demand	mg/L	120	USEPA Multi-Sector General Permit	71	**244**	**488**	70	63	55
Dissolved Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	0.9	0.75	0.46	<0.05	0.2	0.1
Nitrate As N	mg/L	45	Basin Plan	1.2	1.6	1.3	0.4	0.3	0.2
Nitrite As N	mg/L	1	Basin Plan	0.11	0.22	0.18	<0.05	<0.05	<0.05
Surfactants (MBAS)	mg/L	0.5	Basin Plan	<0.5	**0.7**	<0.5	<0.5	<0.5	<0.5

Table 3-1. Constituents of concern measured in the San Diego Bay watershed area during the 2001-2002 Wet Weather Monitoring Program. (Based on Table 5-13 from the MEC November 2002 report.)

ANALYTE	UNITS	Reference Value	Source	San Diego Bay					
				Chollas 11/29/01	Chollas 02/17/02	Chollas 03/08/02	Sweetwater 02/17/02	Sweetwater 03/17/02	Sweetwater 04/25/02
Total Dissolved Solids	mg/L	500-2100	Basin Plan by watershed	71	254	199	**<u>2000</u>**	1050	**<u>2870</u>**
Total Kjeldahl Nitrogen	mg/L			4.6	5.7	9.1	1.5	3	1.2
Total Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	1.08	1.55	**<u>2.08</u>**	0.18	0.29	0.1
Total Suspended Solids	mg/L	100	USEPA Multi-Sector General Permit	67	**<u>151</u>**	**<u>493</u>**	21	47	23
Turbidity	NTU	20	Basin Plan	**<u>63.3</u>**	**<u>36.5</u>**	**<u>121</u>**	7.7	**<u>20.2</u>**	8.24
Pesticides									
Chlorpyrifos	µg/L	0.02	CA Dept. of Fish & Game	**<u>0.04</u>**	**<u>0.13</u>**	**<u>0.04</u>**	<0.03	<0.03	**<u>0.03</u>**
Diazinon	µg/L	0.08	CA Dept. of Fish & Game	**<u>0.68</u>**	**<u>0.82</u>**	**<u>0.61</u>**	**<u>0.10</u>**	**<u>0.27</u>**	<0.03
Hardness									
Total Hardness	mg $CaCO_3$/L			68	111	148	932	499	1010
Total Metals									
Antimony	mg/L	0.006	Basin Plan	<0.002	0.003	0.005	<0.002	<0.002	<0.002
Arsenic	mg/L	0.34/0.05	40 CFR 131/ Basin Plan	0.002	0.004	0.006	0.002	0.002	0.003
Cadmium	mg/L	0.0046	40 CFR 131	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.016	CTR (Cr VI)	0.012	0.009	**<u>0.019</u>**	<0.005	0.007	<0.005
Copper	mg/L	0.0135	40 CFR 131	**<u>0.027</u>**	**<u>0.053</u>**	**<u>0.056</u>**	<0.005	0.01	0.006
Lead	mg/L	0.082	40 CFR 131	0.028	0.032	0.061	0.002	0.006	0.003
Nickel	mg/L	0.47/0.1	40 CFR 131/ Basin Plan	0.009	0.015	0.017	0.003	0.003	0.004
Selenium	mg/L	0.02	40 CFR 131	<0.002	<0.002	<0.002	0.003	<0.002	<0.002

Table 3-1. Constituents of concern measured in the San Diego Bay watershed area during the 2001-2002 Wet Weather Monitoring Program. (Based on Table 5-13 from the MEC November 2002 report.)

ANALYTE	UNITS	Reference Value	Source	San Diego Bay					
				Chollas 11/29/01	Chollas 02/17/02	Chollas 03/08/02	Sweetwater 02/17/02	Sweetwater 03/17/02	Sweetwater 04/25/02
Zinc	mg/L	0.122	40 CFR 131	**0.162**	**0.314**	**0.43**	<0.02	0.045	<0.02
Dissolved Metals									
Antimony	mg/L	(e)	40 CFR 131	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	mg/L	0.34 (c)	40 CFR 131	<0.001	<0.001	0.003	<0.001	0.001	0.003
Cadmium	mg/L	(b)	40 CFR 131	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	(b)	40 CFR 131	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	(b)	40 CFR 131	**0.009**[a]	**0.024**[a]	**0.018**[b]	<0.005	<0.005	<0.005
Lead	mg/L	(b)	40 CFR 131	<0.002	<0.002	0.002	<0.002	<0.002	<0.002
Nickel	mg/L	(b)	40 CFR 131	0.004	0.01	0.008	0.004	<0.002	0.003
Selenium	mg/L	0.2 (d)	40 CFR 131	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	mg/L	(b)	40 CFR 131	0.053	0.118	0.079	<0.02	<0.02	<0.02
Toxicity									
Ceriodaphnia 96-hr	LC_{50} (%)	100		**75.00**	**50.00**	**75.00**	>100	**70.71**	>100
Ceriodaphnia 7-day survival/reproduction	NOEC (%)	100		**25/25**	**25/12.5**	**25/25**	100/100	**25/50**	100/**50**
Hyalella 96-hr	NOEC (%)	100		100	**50**	**50**	100	100	100
Selenastrum 96-hr	NOEC (%)	100		100	100	100	**50**	**50**	**25**

NOTES to Table 3-1 follow.

Notes to Table 3-1.

(a) Reference value is for unionized ammonia; insufficient information is available to calculate unionized ammonia.

(b) Reference values for dissolved metal fractions are based on total hardness and are calculated as described by USEPA, Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(c) Reference values for dissolved metal fractions are based on water effects ratios (WER) and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(d) Reference value is based on the total recoverable form as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(e) USEPA has not published an aquatic life criterion value

Bold and Underlined Text - exceeds reference value

[a] Exceeds the acute aquatic life criterion.

[b] Exceeds the chronic aquatic life criterion.

REC2 standard of 4000 MPN/100 mL apply to this water body.

Sources

USEPA National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities, 65 Federal Register (FR) 64746, Final Reissuance, October 30, 2000.

California Department of Fish and Game. Office of Spill Prevention and Emergency Response, Hazard Assessment and Water Quality Criteria documents for pesticides (various dates).

San Diego Regional Water Quality Control Board Basin Plan Water Quality Objectives.

Assembly Bill 411 - Title 17 of the California Code of Regulations, Section 7958

USEPA National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities, 65 Federal Register (FR) 64746, Final Reissuance, October 30, 2000.

USEPA Federal Register Document 40 CFR Part 131, May 18, 2000.

Table 3-2 Potential Pollutant Exceedances in Chollas Creek

Level of Impact	Potential Pollutant	
Exceeds reference value during all 3 storm events	• Fecal Coliform • Turbidity • Diazinon • Chlorpyrifos	• Total Copper • Total Zinc • *Ceriodaphnia* Toxicity (chronic)
Exceeds reference value during 2 storm events	• COD • *Ceriodaphnia* Toxicity (acute)	• TSS • *Hyallela* Toxicity (acute)
Exceeds reference values during 1 storm event	• BOD • MBAS	• Total Phosphorus • Total Chromium
Did not exceed reference values	• Oil & grease • Dissolved Phosphorus • *Selanastrum* Toxicity • Antimony (T&D) • Arsenic (T&D)	• Lead (T&D) • Cadmium (T&D) • Chromium (T) • Nickel (T&D) • Selenium (T&D) • Dissolved Zinc

3.5.2 Sweetwater River

The Sweetwater River MLS is a new site that was established during the 2001-2002 Copermittee Wet Weather Monitoring Program. This site is located in Bonita, north of Bonita Road, under the Plaza Bonita Bridge. The drainage area consists of 10,800 acres (making up 7% of the total Sweetwater sub-watershed area), comprised of primarily open space (48%), residential (32%), and commercial (13%). Table 3-1 also presents the data for the three storm events monitored at the Sweetwater River MLS during 2001-2002. Both total and dissolved metals were consistently below reference values during all storm events (2/17/02, 3/17/02, and 4/25/02). Diazinon exceeded the reference value for two storm events (2/17/02 and 3/17/02) and chlorpyrifos exceeded the reference value during one storm (4/25/02). Turbidity exceeded the reference value during one storm event (3/17/02), while total dissolved solids exceeded the reference value during two storms (2/17/02 and 4/25/02). The bacteriological data shows that enterococcus exceeded the reference value during all three storm events, while total and fecal coliform exceeded reference values during two storm events. From this initial data set, it appears that the Sweetwater River MLS does not exceed reference values for most chemical constituents.

Since the Sweetwater River MLS site has only been sampled for one wet season (the 2001-2002 season) and there is no historic data available for this location. Therefore, statistical analyses could not be performed as part of the *Monitoring Report* due to the limited data set (MEC, 2002).

Toxicity tests indicated toxicity to *Selenastrum* for all three storm events. There was evidence of both chronic and acute toxicity to *Ceriodaphnia*, during only one storm event (3/17/02) (MEC, 2002).

Table 3-3 presents a summary of the data evaluation for the Sweetwater River MLS.

The bioassessment monitoring included sampling stations in both upper and lower Sweetwater River. Stations were sampled by the California Department of Fish and Game (CDFG) in May 2001 (CDFG has sampled these stations historically as well). Each station was given a "score" based on its benthic macroinvertebrate (BMI) assemblage (species number, type, and abundance) and stream health. Stations were then compared to established indices giving each a ranking. The BMI ranking scores for the Sweetwater River stations include both recent (May 2001) and historic data. Scores for the Sweetwater River stations ranged from well above average to moderately below average. Typically, benthic communities were less impacted in the upper watershed, while the lower Sweetwater River benthic communities exhibited moderate impacts.

Table 3-3 Potential Pollutant Exceedances in Sweetwater River

Level of Impact	Potential Pollutant)
Exceeds reference value during all 3 storm events	• Enterococcus • Diazinon • Chlorpyrifos • *Selanastrum* Toxicity (acute)
Exceeds reference value during 2 storm events	• TDS • Fecal Coliform • Diazinon
Exceeds reference value during 1 storm event	• Turbidity • Chlorpyrifos • *Ceriodaphnia* Toxicity (chronic) • *Ceriodaphnia* Toxicity (acute)
Did not exceed reference value	• Oil & grease • Phosphorus • TSS • BOD • COD • Nitrate • Nitrite • Surfactants (MBAS) • Total & dissolved metals

3.5.3 Otay River

As noted above, there was no stormwater runoff flow at the Otay River MLS, and therefore, no samples were collected. As such, MEC was unable to assess the water quality within this portion of the watershed.

Bioassessment monitoring was conducted within the Otay watershed. Stations were located in Jamul Creek located in the upper portion of the watershed. Nonetheless, MEC concluded that there has not been enough sampling to adequately assess the potential impacts to the benthic community in the Otay sub-watershed.

3.6 Land Use Modeled Pollutants of Concern

Modeling can be used to compare estimated pollutant loads (based on known land uses) to measured pollutant loads. Generally, if measured results are higher than predicted loadings suggest, then there is a higher concentration of pollutants in the watershed than expected. Conversely, if measured loads are less than predicted loads, the data suggests that pollutant loads might be declining in the watershed.

MEC conducted such a modeling effort as part of the 2002 *Monitoring Report*. Although useful, there are a number of uncertainties inherent in the modeling study. The uncertainties include: (1) data collected during the land use monitoring period may not be representative of long term trends; (2) the general assumption that runoff from similar land uses throughout the study area have the same water quality may be incorrect; and (3) the pollutant event mean concentrations (EMCs) calculated for each land use were computed from storm events, and therefore, it was assumed that the constituent concentrations were solely dependant on the land use characteristics of the given basin. Additionally, not all constituents measured in the monitoring program were modeled, so modeling provides only limited loading comparisons. The San Diego Bay Watershed Copermittees will therefore use caution when evaluating the conclusions drawn from the results of the land use - pollutant load model.

The results of the modeling efforts have been summarized in the November 2002 MEC *Monitoring Report*. A general description of the model and the following conclusions relevant to the San Diego Bay watershed as discussed in the Monitoring Report are presented below.

The land uses within each modeled watershed were obtained from SANDAG 2000 Generalized Land Use geographic information system data. The event mean concentrations (EMCs) associated with residential, commercial, and industrial land uses for each modeled parameter were calculated using data from historic Copermittee sampling efforts (See Section 3.4 for specific site locations). The EMCs associated with land uses (agricultural, park, open space, and undeveloped) for each modeled parameter were calculated using data from historic sampling efforts in Los Angeles County, or based upon published information from the USEPA.. The EMCs associated with roadway land use for each modeled parameter were based upon published information from the Federal Highway Administration.

The percent imperviousness associated with each land use type was based on literature data. The runoff coefficient for pervious surfaces was assumed to be 0.20 and the runoff coefficient for impervious surfaces was assumed to be 0.95. Long-term isohyets for San Diego County were used to estimate average annual rainfall for each drainage basin.

The model compared the estimated EMCs with measured EMCs obtained from data collected during the Wet Weather Monitoring Program. The model results are aggregate loadings and EMCs based upon: (1) land use type as a percentage of the watershed; (2) the associated EMC for each parameter as a function of land use type; (3) the percent perviousness/imperviousness associated with each land use type; (4) the runoff-coefficients assumed for pervious and impervious surfaces; and (5) the average annual rainfall for each drainage basin. Pollutants included in the model were BOD, COD, total Kjeldhal nitrogen (TKN), total cadmium, total copper, total lead, total zinc, dissolved phosphorus, and TSS. Model conclusions are presented below.

In general, estimated loads for most pollutants were below reference values. This suggests that inputs from the associated land uses are not negatively impacting water quality beyond beneficial use criteria. However, estimated pollutant loads for copper, zinc, and TSS were higher than the reference values. This indicates that the current land uses for this area may be inputting loads at levels higher than estimated. More importantly, it indicates that higher loads of these pollutants should be expected in the actual measured data (see Table 3-4).

Measured pollutants at Chollas Creek exceeded the pollutant loads predicted by the model for BOD, COD, TKN, total copper, total lead, total zinc, dissolved phosphorus, and TSS. While the measured loads for these constituents exceeded the loads predicted by the model, the model accurately predicted that levels of copper, zinc, and TSS would exceed the reference values. Given that the measured loads for BOD, COD, TKN, and dissolved phosphorus are higher than the loads predicted by the model, there may be additional sources of these materials above those that are expected to correlate with land uses. Measured loads did not exceed the predicted loads for total cadmium.

The pollutant loads at Sweetwater River were estimated to be above the reference values for copper, zinc and TSS. Measured loads did not agree with this, as they were found at levels well below reference values for most pollutants. Sweetwater River only exceeded predicted loads for TKN (see Table 3-4).

TABLE 3-4. A Comparison of Predicted and Measured Pollutant Loads (EMCs) to Reference Values

Parameter and Reference Value*	**Chollas Creek**		**Sweetwater River**	
	Predicted EMC in comparison to Reference Value (RV)	**Measured EMC in comparison to Reference Value (RV)**	**Predicted EMC in comparison to Reference Value (RV)**	**Measured EMC in comparison to Reference Value (RV)**
BOD (30mg/L)	**Less than RV**	**Greater than RV**	**Less than RV**	**Less than RV**
COD (120mg/L)	**Less than RV**	**Greater than RV**	**Less than RV**	**Less than RV**
TKN (**)	**	**	**	**
Dissolved Phosphorus (2mg/L)	**Less than RV**	**Less than RV**	**Less than RV**	**Less than RV**
Total Cadmium (4.6ug/L***)	**Less than RV**	**Less than RV**	**Less than RV**	**Less than RV**
Total Copper (13.5ug/L***)	**Greater than RV**	**Greater than RV**	**Greater than RV**	**Less than RV**
Total Lead (82ug/L***)	**Less than RV**	**Less than RV**	**Less than RV**	**Less than RV**
Total Zinc (122ug/L***)	**Greater than RV**	**Greater than RV**	**Greater than RV**	**Less than RV**
Total TSS (100mg/L)	**Greater than RV**	**Greater than RV**	**Greater than RV**	**Less than RV**

* Reference values are shown in parentheses

**There is no reference value currently in use for TKN

*** Reference value for dissolved metal fractions are based on total hardness and are calculated as described by USEPA, Federal Register Doc. 40 CFR Part 131, May 18, 2000.

3.7 Data from the 303(d) Listing Process

As noted in Section 3.2.1 above, the data assessment portion of *this San Diego Bay Watershed URMP* considers all applicable programs, regulatory requirements, and the data that has been collected to best establish an accurate assessment of the water quality within the San Diego Bay watershed. The approved List of Section 303(d) Water Quality Limited Segments within the San Diego Bay watershed is another one of the data sources.

In 1998, the San Diego RWQCB reviewed and evaluated a wide variety of information that had been assembled as part of the Clean Water Act (CWA). Section 303(d) of the Act requires states to periodically prepare a list of all surface waters in the state for which beneficial uses of the water; such as for drinking, recreation, aquatic habitat, and industrial use; are impaired by pollutants. These are water quality limited estuaries, lakes, streams, and coastal regions that fall short of state water quality standards, and are not expected to show improvement in the next two years. The San Diego RWQCB provides recommendations to the State Water Resources Control Board (SWRCB) as to which water bodies should be included on the 303(d) list. The SWRCB adopts a final list, which must then be approved by the United States Environmental Protection Agency (USEPA). Portions of the adopted and approved 1998 303(d) list relevant to the San Diego Bay watershed are presented in Table 3-5.

San Diego Bay itself is listed three times on the 1998 303(d) list. The data that resulted in the placement of these San Diego Bay locations on the 1998 303(d) list was not data collected or managed by the Copermittees. It is interesting to note, however, that the locations listed for benthic community effects and sediment toxicity coincide with urban runoff discharge locations into San Diego Bay, either through storm drains or urban creeks.

The analytical chemistry and toxicity data from the Chollas Creek MLS (see Section 3.5.1 above) resulted in the placement of Chollas Creek on the 1998 303(d) list of impaired water bodies. Chollas Creek was listed for high concentrations of cadmium, copper, lead, zinc, bacteria, and toxicity in stormwater. As noted above, the portion of San Diego Bay at the mouth of Chollas Creek was also placed on the 1998 303(d) list for benthic community degradation and sediment impairment. It should also be noted that the sediments at the mouth of Chollas Creek at San Diego Bay have been identified as a Toxic Hotspot under the Bay Protection and Toxic Cleanup Program.

The pollutants noted on the 1998 303(d) list of impaired water bodies in the San Diego Bay Watershed are considered potential contaminants of concern that may be indicative of major water quality problems.

Table 3-5. 1998 Adopted and Approved 303(d) Listed Water Bodies Within the San Diego Bay Watershed

Region	Type	Name	Hydographic Unit	Pollutant/Stressor	Source	Priority	Size Affected	Unit
9	B	San Diego Bay	900.00	Bentic Community Effects *The listing covers the following areas: Near Sub Base16 acres, Near Grape Street 7 acres, Downtown Piers10 acres, Near Coronado Bridge 30 acres, Near Chollas Creek 14 acres, San Diego Naval Station 76 acres, Seventh Street Channel 9 acres, North of 24th Street Marine Terminal 10 acres.*	Nonpoint/Point Source	High	172	Acres
				Copper *The listing is for dissolved copper in the Shelter Island Yacht Basin in San Diego Bay*	Nonpoint/Point Source	High	50	Acres
				Sediment Toxicity *The listing covers the following areas: Near Sub Base16 acres, Near Grape Street 7 acres, Downtown Piers10 acres, Near Coronado Bridge 30 acres, Near Chollas Creek 14 acres, San Diego Naval Station 76 acres, Seventh Street Channel 9 acres, North of 24th Street Marine Terminal 10 acres.*	Nonpoint/Point Source	High	172	Acres
9	B	San Diego Bay, Lindbergh	908.21	High Coliform Count	Nonpoint/Point Source	Low	0.02	Miles
9	B	San Diego Bay, Telegraph	909.11	High Coliform Count	Nonpoint/Point Source	Low	0.01	Miles

Table 3-5. 1998 Adopted and Approved 303(d) Listed Water Bodies Within the San Diego Bay Watershed

Region	Type	Name	Hydographic Unit	Pollutant/Stressor	Source	Priority	Size Affected	Unit
9	R	Chollas Creek	908.22	Cadmium *Elevated levels in Stormwater*	Nonpoint/Point Source	High	1	Miles
				Copper *Elevated levels in Stormwater*	Nonpoint/Point Source	High	1	Miles
				High Coliform Count *Elevated levels in Stormwater*	Nonpoint/Point Source	Low	1	Miles
				Lead *Elevated levels in Stormwater*	Nonpoint/Point Source	High	1	Miles
				Toxicity *Toxicity in Stormwater*	Nonpoint/Point Source	High	1	Miles
				Zinc *Elevated levels in Stormwater*	Nonpoint/Point Source	High	1	Miles

Abbreviations:
Regional Water Quality Control Board 9 = San Diego
Water Body Type: B = Bays/Harbors C = Coastal Shorelines R = Rivers/Streams
Hydro Unit "Hydro Unit" is the State Water Resources Control Board hydrological subunit area.
"GROUP A" or "CHEM A" PESTICIDES = aldrin, dieldrin, chlordane, endrin, heptachlor, or epoxide, hexachlorocyclohexane (including lindane), endosulfan, and toxaphene

Source: California Water Resources Control Board -- http://www.swrcb.ca.gov/tmdl/docs/303dtmdl_98reg9.pdf

3.8 Other Data and Information Sources

In addition to the water quality information described above, the San Diego Bay Watershed Copermittees have considered other relevant sources of data and information to provide additional insight into the identification of potential water quality problems. These additional sources of information include:

3.8.1 Focused Studies of Chollas Creek

In 1998, Chollas Creek was listed as a 303(d) impaired water body for metals, coliform bacteria, and toxicity. Shortly thereafter, and in accordance with Clean Water Act requirements, the RWQCB initiated a Source Identification Study, as part of the Total Maximum Daily Load (TMDL) development process. The TMDL process has led to several study efforts focused on stormwater in Chollas Creek. These studies are outlined below.

3.8.1.1 Toxicity Identification Evaluation Study

In 1999, the Southern California Coastal Waters Research Project (SCCWRP) coordinated the efforts of several stakeholders in a stormwater toxicity characterization study. The study was designed to determine the pollutants causing toxicity in the Chollas Creek sub-watershed. The study used the Toxicity Identification Evaluation (TIE) procedure to isolate specific pollutants and to determine the toxic effect of each. The report entitled *Characterization of Stormwater Toxicity in Chollas Creek* (SCCWRP, 1999) found that: 1) diazinon was the likely pollutant causing *Ceriodaphnia dubia* (water flea) toxicity; and 2) zinc and, to a lesser extent, copper were the likely pollutant(s) causing toxicity to *Strongylocentrotus purpatus* (purple urchin). SCCWRP recommended: additional TIE testing to confirm toxicants; further studies to establish a link between creek measurements and impairments in the receiving waters; and source tracking using both toxicological and chemical testing.

3.8.1.2 Chollas Creek Watershed Monitoring Study – 1999-2002

The Chollas Creek stakeholders acted upon the recommendations of SCCWRP, and collaborated on additional studies that provided information on upstream areas of the Chollas Creek sub-watershed. Funding from the California Department of Pesticide Regulation helped to support these efforts. The study consisted of storm events during the 1999-2000, 2000-2001, and 2001-2002 wet weather seasons and one dry weather survey during the fall 2000. The testing included analysis of diazinon, chlorpyrifos, copper, lead, zinc, general chemistry, and toxicity testing. MEC summarized the effort in a report entitled *1999-2001 Chollas Creek Watershed Monitoring, Final Report*, dated May 2002. The report presented the findings from all the surveys and assessed the results in an attempt to: 1) understand the relationship between toxicity effects and chemical concentrations measured in stormwater; and 2) identify if any region or reach within the Chollas Creek sub-watershed is the primary source of contaminant(s). As noted in the report, five storm events were sampled, four in the middle of the storm season and one as the first flush of the storm season. The sampling yielded a total of 34 sets of results for statistical evaluation of the relationships between organophosphate pesticides, total and dissolved metals, and toxicity. The study led to the following conclusions:

1) The contaminants measured were ubiquitous throughout the sub-watershed. The concentrations of contaminants and the toxicity varied from storm to storm, without any consistent patterns at the sample stations. No single sample station or area of the sub-watershed could be identified as the primary source of the contaminant(s).
2) The first flush storm of the season had the highest toxicity effects throughout the sub-watershed at each station and the highest concentrations of diazinon detected at all stations. The mean concentrations of total metals for all stations were highest during the first flush storm event, however the mean concentrations of dissolved metals were not considerably greater during the first flush event than other storms monitored. Concentrations of chlorpyrifos during the first flush storm were within the range of concentrations observed during the other storm events.
3) Toxicity to *Ceriodaphnia dubia* was linked to diazinon in the sub-watershed. A correlation between toxicity to *Ceriodaphnia dubia* and diazinon concentration was observed for this study after collecting the fifth storm event. It took a total of 34 samples to obtain a correlation of $r^2 = 0.7032$. This supported the findings of the TIE coordinated by SCCWRP (1999) referenced above.

MEC also made the following observations as part of their 2002 report:

a) Diazinon and total copper concentrations exceeded chronic water quality criteria during the majority of storm events throughout all of Chollas Creek.

b) Total lead concentrations exceeded acute water quality criteria during the majority of storm events throughout all of Chollas Creek.

c) Total zinc concentrations in the upstream east and west tributaries to the north fork of Chollas Creek exceeded chronic water quality criteria during many of the storm events.

d) Dissolved metals concentrations were generally low throughout all of Chollas Creek, with the exception of dissolved copper in the east tributary of the north fork of the creek.

e) Chlorpyrifos concentrations were greater in the south fork tributary of Chollas Creek.

It should be noted that both of the Chollas Creek study efforts listed above were used to support the development of a TMDL for diazinon in the Chollas Creek sub-watershed. On August 14, 2002, the RQWCB adopted a TMDL for diazinon in the Chollas Creek.

3.8.2 Designated Toxic Hotspots in San Diego Bay

Several areas of San Diego Bay have been identified as Toxic Hotspots based upon findings in the California Bay Protection and Toxic Cleanup Program. Some of these locations coincide with the problem areas listed on the Section 303(d) List of Water Quality Limited Segments. Most of these areas lie at the mouths of creeks, streams, or storm drains, which suggests that urban runoff may be contributing to toxicity. The City of San Diego, the Port of San Diego, and the Navy have agreed to coordinate study efforts directed at the Toxic Hotspots that appear to be associated with urban runoff impacts (the remaining two Toxic Hotspots sites are associated with shipyards on San Diego Bay). The Navy has begun sampling efforts at the mouths of Chollas Creek and Paleta Creek. These efforts are being used to help design future efforts at the other locations. The RWQCB, the Port of San Diego, and City of San Diego have also begun efforts to confirm the Toxic Hotspot designations at the Downtown Piers and Grape Street sites. These sampling programs may be used to support the development of TMDLs. The results of these studies will be evaluated upon completion and may provide additional support to Copermittees' prioritization decisions for the San Diego Bay watershed.

3.8.3 Regional Water Quality Control Board Actions

In addition to the studies and actions already described above, in September of 2001, the RWQCB sent "Directives Issued Pursuant to California Water Code Sections

13267, 13225, and 13383 for an Investigation of Exceedances of Water Quality Objectives for Floating Material in Chollas and Paleta Creeks" to National City and the City of San Diego. The directives noted that trash and floating material had been observed in significant quantities at the mouths of and in the lower reaches of both creeks. Both National City and the City of San Diego responded to the directives. The Port of San Diego and the Navy also offered assistance. Programs are now in place to reduce and eliminate the amount of trash and floating material in these two creeks. The situation has brought the issue of trash to the attention of the San Diego Bay Watershed Copermittees.

3.9 Future Monitoring Program Recommendations

3.9.1 Future Wet Weather Monitoring Program Elements

The data from the current Copermittee monitoring efforts were evaluated using the weight of evidence approach and the triad decision matrix. In addition to continued monitoring of all the constituents that made the potential list of target COCs, the San Diego Bay Watershed Copermittees have considered the recommendations for future monitoring efforts presented by MEC in the 2002 *Monitoring Report*. MEC recommends, and the initial watershed data assessment suggests, that the following monitoring program additions would provide a more complete data set for future data analysis.

1) A TIE using *Hyalella* should be performed to establish the constituent of concern causing toxicity in Chollas Creek. Once the constituents are identified, they should be added to the monitoring list and assessed during future stormwater monitoring.

2) A bioassessment station should be added (if possible) within Chollas Creek since the triad decision matrix relies on benthic community data as one of the critical components in determining the "health" of a waterbody.

3) A TIE study using *Selenastrum* should be performed during the upcoming monitoring season to determine the class or type of constituents responsible for toxicity. Once the constituents are identified, they should be added to the monitoring list and assessed during future stormwater monitoring.

3.9.2 Dry Weather Monitoring Programs

All San Diego Bay Watershed Copermittees are currently conducting dry weather monitoring according to the requirements in the Municipal Permit. These sampling sites are intended to help Copermittees discover and eliminate illegal connections/illicit discharges (IC/IDs). Figure 3-1 shows all of the dry-weather monitoring stations currently being observed/sampled by the San Diego Bay Watershed Copermittees. These sites may also play a role in assessing watershed pollutants and add another valuable component in the watershed water quality assessment.

The water quality assessment presented here in Section 3 has only considered data preliminarily available from the Copermittee 2001-2002 dry weather monitoring programs, because the individual Copermittees had not analyzed the majority of the data at the time this assessment has been conducted. The complete data set will be compiled and evaluated in future San Diego Bay watershed water quality assessments.

3.9.3 Ambient Bay and Lagoon Monitoring Program

This program is required by the Municipal Permit and will assess the overall health of the receiving water and monitor the impact of urban runoff on ambient receiving water quality. The monitoring approach will focus on the relationship between potential COC, sediment characteristics, and associated benthic community impacts. Initial monitoring for this program will be conducted in the spring of 2003 after the total wet weather load has been discharged to the receiving waters. Data from this program will not be available until January of 2004. Once available, this data component may become a regular part of the annual data assessment.

3.9.4 Monitoring of Water Supply Systems

The City of San Diego Water Department (SDWD) conducts long-term monitoring of its drinking water supplies. The monitoring is conducted at three water supply reservoirs (Lower Otay, Barrett, and Morena Reservoirs) and at sixteen stream sites that are tributary to these reservoirs. The monitoring program has two main purposes. The first is to assess the current state of water quality in the reservoirs and streams, specifically in the context of drinking water standards. These assessments are used to guide the day to day operation of the water supply system and are the foundation for decisions on water treatment options. The second purpose is to establish a long-term archive of water quality data for the reservoirs and tributary streams. This long-term data archive has been and will continue to be used to design in-reservoir water quality management projects and to assess the trends in water quality.

The San Diego Bay Watershed Copermittees believe that some or all of the long term water quality data collected by the City of San Diego Water Department may be useful when interpreting the health of the San Diego Bay Watershed's reservoirs and streams. While the monitoring data from this program was not used in the current assessment, it may be considered in future assessment efforts.

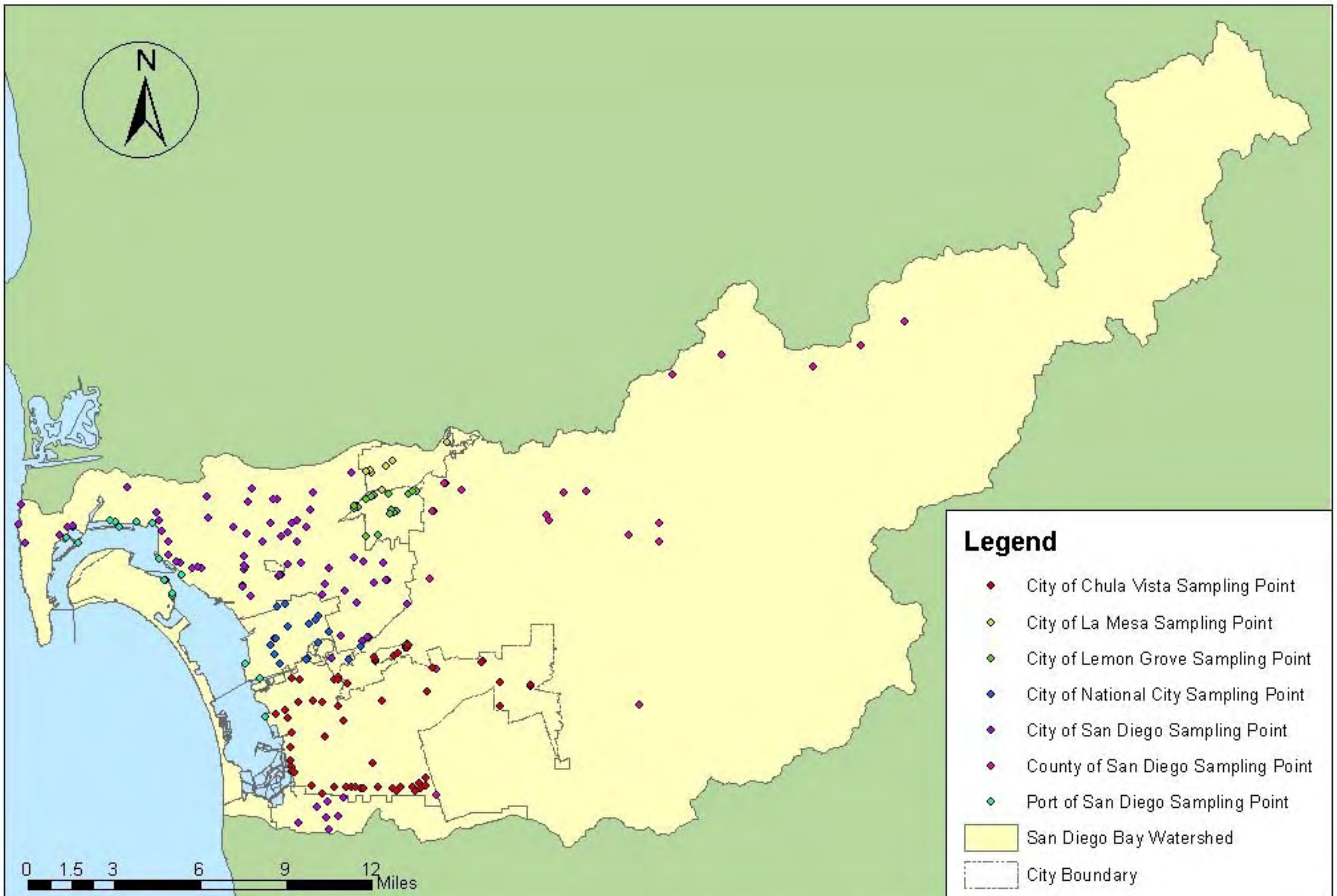

Figure 3-1 Dry-Weather Sampling Points In the San Diego Bay Watershed

3.10 Overall Watershed Assessment and Recommendations

The overall data assessment utilizes all of the data and applicable programs described above to establish a comprehensive "target list" of COC that warrant further review. To characterize a pollutant as a COC, all the historic data and the current MLS data was compared to associated reference values. Reference values include, but are not limited to, water quality objectives in the San Diego *Basin Plan*, similar water quality standards, and stormwater discharge quality objectives. (It should be noted that the standards identified in the USEPA Multi-Sector General Permit are discharge-quality objectives rather than in-stream water quality standards. These reference values have been included for comparison and any exceedance of these values does not necessarily constitute a violation of a permit, regulation, or statute.) The overall assessment may include recommendations for appropriate tracking and reassessment of COCs, or it may lead to the identification of potential water quality problems based on COC exceedances. As the historical record continues to be expanded and assembled for the San Diego Bay watershed, the "target list" of COC may change. It is anticipated that future assessments will use trend analysis and/or similar methods for continued monitoring and evaluation of COCs. The potential COCs are identified here, along with a justification for their inclusion.

Based on all the information presented above, copper, lead, zinc, diazinon, turbidity/TSS, bacteria, TKN, and trash represent potential COCs for the San Diego Bay watershed.

Copper, zinc, diazinon, and turbidity/TSS repeatedly exceed reference values in both current and historic monitoring data. Additionally, diazinon, copper, and zinc have been linked to toxicity in Chollas Creek. These COCs have been found at several historic sampling locations, and continue to be indicative of potential problems in the current MLS sampling. These COCs generally form the basis for the 1998 303(d) listings and are associated with the toxicity identified in the current Copermittees Wet Weather Monitoring program. It appears that most of the exceedances for copper, zinc, and turbidity lie within locations characterized by highly urbanized land uses.

Elevated levels of bacteria are present in historic samples and at the current Chollas and Sweetwater River MLS sites. The data analyzed to date suggests that bacteria are a concern and should be considered on the target list of COC for the San Diego Bay watershed. It should be noted that high levels of bacteria are often associated with high BOD and COD levels. The combination of these three elevated constituents may be indicative of potential sewage spills or overflows during wet weather storm events. A preliminary review by the County of San Diego of their dry weather field data within the

Sweetwater sub-watershed has identified over half of their sites as having bacteria concentrations above the reference values. These preliminary findings have resulted in a commitment by the County to develop an action plan to investigate, and potentially reduce bacteria levels in dry weather samples in the Sweetwater sub-watershed. The County intends to enlist the assistance of the other Sweetwater sub-watershed Copermittees in this effort. Further monitoring may be necessary to positively link these three constituents with sewage spills, and future upstream source investigations may be warranted.

Chlorpyrifos is identified as a potential COC because it has been present at levels above the reference value. However, unlike diazinon, it has not been positively linked to toxicity. Detection limits have been modified in the current monitoring program so that chlorpyrifos levels can be adequately assessed in the future. Lead is identified as a potential COC based upon its historic presence throughout the watershed (Bramson, Crosby St., California St. and Switzer Creek). However, lead concentrations have been declining in Chollas Creek and may be on the decline throughout the watershed. Lead has not been present in levels above the reference value since the 1998-99 monitoring program. Additional monitoring and data analysis efforts are required before the San Diego Bay Watershed Copermittees can determine whether chlorpyrifos and/or lead should be identified as COCs that might be indicative of potential water quality problems.

National City, the City of San Diego, the Port of San Diego, and the Navy have addressed the issue of trash and floatables in Chollas and Paleta Creeks. Trash is currently an isolated issue in the San Diego Bay watershed. Programs are currently in place to reduce the amount of trash in the creeks, and those programs will be modified as necessary.

Given all the above, the target COCs for the San Diego Bay watershed are:

- Copper
- Zinc
- Diazinon
- Turbidity/TSS
- Bacteria (total coliform, fecal coliform, and enterococcus)

3.10.1 Chollas Creek

As noted above, Chollas Creek provides the San Diego Bay watershed with a data history spanning almost 10 years. Chollas Creek has been site of mass load sampling since the 1993-1994 wet weather season. Several long-term trends have already been analyzed, and problems have already been identified. Since Chollas Creek was first listed on the 303(d) list of impaired water bodies in 1998, focus studies have been conducted to identify the cause of water quality problems. Programs designed to address these problems are already in progress, including a TMDL for diazinon adopted by the RWQCB in August of 2002.

As previously noted, the modeled pollutant loads for copper, zinc, and TSS are predicted to be above the reference values. This information provides addition support for identifying these constituents as “targeted COCs” for Chollas Creek. Given land uses throughout the Chollas drainage area, it is highly likely that copper, zinc, and TSS will continue to be present in high levels.

3.10.2 Sweetwater River

Since the Sweetwater River MLS sites are new and have only been sampled during the 2001-2002 wet weather season, there is limited data available. Long-term trend analysis cannot be performed and most importantly, only limited conclusions can be drawn at this time. Single constituent reference value exceedances occurred during the 2001-2002 wet weather season, however, they varied from storm event to storm event and none of the exceedances were determined to be consistent. Concentrations of metals never exceeded reference values. Toxicity to *Selanastrum* was evident, but its cause has not been determined. Benthic communities showed some impacts, but no causative agent. Diazinon was found to exceed the reference value at this site in two of the three storms. However, given that toxicity was exhibited during storms when diazinon was not present at toxic levels, there is not enough evidence at this time to positively link elevated diazinon directly to toxicity. TDS levels were slightly elevated and a further review of the contribution of groundwater recharge to this issue may be warranted. Based on the limited data set, it has been determined that further data must be collected before a confident assessment of water quality can be made for Sweetwater River.

The model predicted that pollutant loads for copper, zinc, and TSS in the Sweetwater watershed would exceed their respective reference values, however, the measured data for these COCs are well below the reference values. Pollutant loads in this watershed appear to be less than what is typically expected for the given land uses.

Section 4: Major Water Quality Problems

4.1 Identification of Water Quality Problems

The process of identifying the constituents of concern (COC) in the San Diego Bay watershed is based on the data review (both current and historic) and water quality assessment discussed in Section 3. Once the "target list" of COCs has been identified, a list of high priority water quality problems is prepared using a qualitative prioritization process that looks at watershed specific conditions using data assessment factors and best professional judgment to interpret the relationship between exceedances, regulatory mechanisms, and technical solutions.

The data assessment evaluation in Section 3 has identified the following as major water quality problems for the San Diego Bay watershed:

1) Copper and Zinc
2) Diazinon
3) Bacteria
4) Turbidity/TSS

The data assessment further suggests that, for the most part, the majority of the San Diego Bay watershed's water quality problems exist primarily within Chollas Creek.

4.2 Prioritization of Water Quality Problems

The San Diego Bay Watershed Copermittees have prioritized the water quality problems identified in Section 4.1 based on the "scale" or watershed-wide extent of the problem, the magnitude of the reference value exceedance, and the reoccurrence, or consistency of the COC (based on historical data). Several COC may be determined in the assessment to be sporadically high but cannot be considered a confirmed problem (due to lack of data, etc). These COC will require further assessment and/or additional monitoring to validate that they exist. For the sake of consistency, major water quality problems will be considered high priority when the identified constituents of concern (COC): (1) exhibit a long-term trend of reference value exceedances or are present in more than one location throughout the watershed; and (2) could be considered potential causes of toxicity in bioassay test organisms.

Based upon the identified water quality problems and prioritization criteria, it is clear that the highest priority water quality problems within the San Diego Bay watershed are metals and pesticides, namely copper, zinc, and diazinon. These COCs have been listed as high priority because they show long-term presence, exceed the reference values in several historical and current MLS samples, and have been determined to be toxic. These particular COCs also tend to accumulate in the environment and continue to show long lasting detrimental effects. Bacteria and turbidity/TSS have also been measured above reference values in samples from both the Chollas Creek and Sweetwater MLSs; however, these particular COCs are not considered potential causes of toxicity in bioassay test organisms. While Chollas Creek is the focus area for major water quality problems, actions taken there can be duplicated throughout the entire San Diego Bay watershed. The water quality problems, their prioritization, and justification for the prioritization are presented in Table 4-1.

Table 4.1 List of Water Quality Problems for the San Diego Bay Watershed

Constituent of Concern	Priority	Justification
Diazinon	High	Levels exceed reference values at both Chollas and Sweetwater MLS. TMDL has been adopted for diazinon in the Chollas Creek sub-watershed.
Copper, Total and Dissolved	High	Long-term presence; Levels significantly exceed reference values; COCs present at multiple historical stations within the Pueblo San Diego sub-watershed.
Zinc, Total and Dissolved	High	Long-term presence; Levels significantly exceed reference values; COCs present at multiple historical stations within the Pueblo San Diego sub-watershed
Bacteria	Low	Levels exceed reference values at both the Chollas (historic and current) and Sweetwater MLS. However, bacteria is not considered a potential cause of toxicity in bioassay test organisms.
Turbidity/TSS	Low	Levels exceed reference values at both the Chollas and Sweetwater MLS. However, turbidity/TSS is not considered a potential cause of toxicity in bioassay test organisms.

Section 5: Short and Long Term Activities

5.1 Actions Selection Process

Based on the yearly watershed assessment, participating jurisdictions will work together to address the issues that have been identified through this process.

It should be noted, as the water quality assessment is refined, that water quality issues may be identified at several levels: the jurisdictional (municipal, county or other governmental entity), cross-jurisdictional (watershed-wide), or regional levels (cross-watersheds). Generally, a water quality problem that is determined to be specific to a jurisdiction would be referred to the source agency and addressed through their existing program or *Jurisdictional Urban Runoff Management Plan (JURMP).* In other cases, the source(s) may be found to originate from two or more jurisdictions, in which case the problem would be addressed as part of the watershed-based program. Lastly, the issue may be found at regional levels (impacting more than one watershed) and would be referred to the appropriate regional technical committee (Monitoring, Outreach, Budget, etc.) for their assessment and recommendations.

Updates to this program will be submitted as part of the annual report and will include the annual evaluation of water quality issues at the watershed level as well as pertinent revisions to the action plan.

Many of the activities addressing water quality problems across the watershed may be similar and applicable across jurisdictions. The watershed partners will likely work within their current programs (*JURMPs*) rather than creating a new program. The watershed-based program can focus efforts and bring consistency to jurisdiction specific approaches. It is anticipated that program actions will be developed and implemented at the jurisdictional, cross-jurisdictional, and regional levels. Participating agencies and partners will seek to maximize opportunities for regional cooperation and ensure that limited resources are allocated in the most cost-effective manner. As time and resources permit, grant funding will be pursued wherever possible.

The general steps used to identify and implement activities to address water quality issues vary significantly, but may include the following as time and resources permit:

- Determining the extent of each water quality problem (spatial, temporal, and magnitude) and identify unknown pollutants.

- Determining the need for additional data or studies when data or information gaps are identified.
- Identifying existing activities in the watershed related to water quality issues and assessing extent and efficacy of current efforts.
- Identifying potential mechanisms to reduce pollutant load and its concentration (structural and non-structural Best Management Practices including education and outreach).
- Assessing, as appropriate, the efficacy, economical impact, benefit to cost ratios, and technical feasibility of potential actions.
- Identifying funding sources for actions under consideration.

The process of planning actual implementation and scheduling of corrective actions will be iterative, cooperative, and likely to change over the course of time as the program develops.

The list of pertinent actions and implementation schedules will be updated and refined through the annual program reporting process. Short and long-term activities may be designated for consideration in future years and labeled as tentative projects. Short-term activities may in some cases, due to the ease of implementation, be scheduled within a year or two, but staggered to allow for ease of project and workload management.

As the program develops, participants will use and refine the approach described above to proceed with planning and implementation efforts.

5.2 Planned Actions

The water quality assessment of the first year of this program, as described in the previous chapter, leads to six actions as described below.

5.2.1 Short-Term Activities

San Diego Bay Watershed Copermittees have identified the following items as short-term activities to address the major water quality problems identified in Section 4 of this Watershed URMP document. Copermittees will be tracking and reporting the implementation of these programs in the 2004 *San Diego Bay Watershed URMP Annual Report*, and in subsequent years as well.

5.2.1.1 TMDL for Diazinon in Chollas Creek

On August 14, 2002, the RWQCB adopted a Total Maximum Daily Load for diazinon in the Chollas Creek sub-watershed. To ensure that waste load allocations are being achieved, the TMDL prescribes a set of activities or programs that must be implemented by all Copermittees in the Chollas Creek sub-watershed. The San Diego Bay watershed Copermittees that are subject to the TMDL will develop and implement the following programs:

- Legal Authority

  The Copermittees will enforce existing ordinances, or adopt new legal authority as needed to ensure compliance with waste load allocations for diazinon.

- Diazinon Toxicity Control Plan

  The Copermittees will develop and implement a "*Diazinon Toxicity Control Plan*" to promote Copermittee compliance with waste load allocations specified in the TMDL. The plan will consist of pollution prevention practices designed to reduce the discharge of diazinon to Chollas Creek.

- Public Outreach/Education Program

  The Copermittees will develop and implement a focused public outreach / education program designed to reduce the discharge of diazinon in the Chollas Creek watershed. By reducing the discharge of diazinon, the program will promote Copermittee compliance with the waste load allocations specified in the TMDL. Components of this program will include education and outreach materials for municipal, construction, industrial, residential, and Quasi-governmental communities.

- Monitoring

  The Copermittees will perform stormwater sampling for three storms during the wet weather season. (Wet weather storm events are characterized by the same criteria as monitoring for the Municipal Permit.) Monitoring will include diazinon testing at locations selected to adequately characterize both major forks of Chollas Creek. All test results will be required to meet the 0.05ug/L reporting limit for Diazinon. Toxicity testing using *Ceriodaphnia* will also be conducted for both chronic and acute toxicity during each of the three storm events at the Chollas Creek MLS.

- Reporting

  The Copermittees will submit the following reports to the RWQCB:

<u>Effectiveness report</u>

Each Copermittee will be directed to describe the implementation schedule and effectiveness of the Diazinon toxicity control plan.

<u>Monitoring reports</u>

The Copermittees will implement and report on the findings the monitoring plan.

<u>Annual reports</u>

The Copermittees will submit annual reports to the RWQCB.

5.2.1.2 Regional Integrated Pest Control Management Campaign

Diazinon has been identified as a high priority major water quality problem in the San Diego Bay watershed. Chlorpyrifos has also been discussed as a potential watershed contaminant of concern (in Section 3 above) and organophosphate pesticides have been identified as regularly exceeding water quality reference values in several watersheds throughout the region. The San Diego Regional Water Quality Control Board has identified education as the single most effective best management practice (BMP) to address water quality degradation related to pesticide use. Education efforts in relation to pesticides will focus on promoting responsible practices in irrigation and use of pesticides, as well as providing information about alternative pest-control techniques.

A *Pest Management Guide* (such as the one produced by the City of Modesto Storm Water Program in cooperation with the University of California Statewide Integrated Pest Management Project) will be produced at the regional level for use at many diverse outreach events within San Diego County. Other targeted outreach opportunities, such as "point of purchase" campaigns, will be explored and integrated with existing efforts as appropriate. The guide and other general educational materials will be widely distributed to residents and businesses within the region regardless of jurisdictional boundaries. As part of the campaign, outreach efforts will be implemented through a series of public workshops and/or visits and presentations to existing stakeholders' meetings.

It is anticipated that the *Pest Management Guide* will be produced within the short term as a regional effort. Distribution and outreach is expected to occur over the long run and beyond the life of the current Municipal Permit. The County of San Diego will lead and coordinate development and implementation of the regional campaign in cooperation with interested stakeholders.

5.2.1.3 Bacteria Source Investigation Project

Bacteria have been identified as a low priority major water quality problem in the San Diego Bay watershed (Section 4 above). Due to the limited amount of data used for the assessment, additional verification and validation using water quality data from a variety of sources is required. Further refinement of this activity will be needed to identify persistent sources of bacteria. Until a comprehensive data review is performed, source(s) or cause(s) cannot be positively identified and remedied.

Unless significant additional resources become available, this short-term activity will focus on data collection and evaluation from current jurisdictional programs (dry weather monitoring, coastal outfall monitoring, and ambient bay and lagoon monitoring, etc.) as a first phase of source identification. Existing and future data collected by the individual jurisdictions will be compiled and reviewed. Additional MLS data from wet weather testing in 2002-2003 will also be reviewed for any changes compared to 2001-2002 and the historical data at the Chollas Creek and Sweetwater MLS.

As part of a second phase of this activity, Copermittees will assess the information and results from existing source identification projects currently underway in Mission Bay and the San Diego River that address similar problems. The design, implementation, and outcome of these two projects may provide a model and/or direction to solving the bacteria problem for the San Diego Bay watershed and implementing BMPs for specific, discrete sources known to contribute bacteria to the receiving waters.

5.2.1.4 Data Collection and Analysis

It will be imperative to review the results and conclusions from these efforts to provide the most complete assessment possible of water quality problems. The data generated from these independent program efforts will be easier to manage if collected using pre-established protocols developed for the watershed and subsequently the region. This recommendation may be fulfilled by existing efforts in the region, but still require coordination at the watershed level. Data may be centralized for ease of management and analysis in the future.

There are many complementary programs generating significant amounts of data and information that may be used to evaluate watershed water quality in the *San Diego Bay Watershed URMP Annual Report*. Some of these are discussed in Section 3.9 above, and also include:

- Copermittee Dry Weather monitoring reports
- Special studies or monitoring information

- Coastal and Lagoon Outfall Monitoring
- Copermittee Illicit Discharge Detection and Elimination reports
- Water Supply Systems Monitoring Data

For example, the *Jurisdictional Urban Runoff Management Plans* for each of the San Diego Bay Watershed Copermittees include the implementation of a Dry Weather Monitoring Program using regional, uniform data gathering standards. This first year water quality assessment should be followed by a review of the compiled results of these jurisdictional efforts. The review will seek to identify any potential links between the constituents of concern and prioritized water quality problems in this *Watershed URMP*.

In addition, as noted in Section 3.9 above, the following new monitoring efforts are being initiated in the San Diego Bay watershed to provide a more complete data set for future data analysis (Monitoring Report, MEC 2002):

1) A TIE using *Hyalella* to establish the constituent of concern causing toxicity in Chollas Creek.

2) A TIE study using *Selenastrum* in the Sweetwater River to establish the constituent of concern causing toxicity in stormwater runoff.

Results of this TIE will be presented in the *San Diego Bay Watershed URMP Annual Report* as the information becomes available, assuming that sufficient samples can be collected and analyzed.

The results of Copermittee Dry Weather Monitoring Programs and the Ambient Bay and Lagoon Monitoring Programs will be incorporated into future data assessments. The San Diego Bay Watershed Copermittees also intend to re-evaluate trash as a constituent of concern that may be indicative of a major water quality problem.

There are efforts underway among the San Diego Bay Watershed Copermittees and all the Copermittees through the region to standardize and perhaps centralize data. A long-term benefit of centralized data collection and management efforts would be the identification of potential temporal and spatial data gaps for the watershed.

Future data and information review may lead to re-prioritization of water quality problems and new short- and long-term activities.

5.2.2 Long-Term Activities

San Diego Bay Watershed Copermittees have identified the following items as long-term activities to address the major water quality problems identified in Section 4 of this Watershed URMP document. Copermittees will be tracking and reporting the implementation of these programs over the next several years.

5.2.2.1 SUSMP Implementation

Turbidity/TSS were identified as a low priority major water quality problem in the San Diego Bay watershed. The San Diego Bay Watershed Copermittees have begun to implement the *Standard Urban Storm Water Mitigation Plan (SUSMP*) process in each jurisdiction beginning in December 2002. *SUSMPs* should provide additional measures to reduce the loading of sediment and silt conveyed by the municipal storm sewer system (MS4) to the receiving waters.

The *Model SUSMP* was developed collectively by the Copermittees to address post-construction urban runoff pollution from new development and redevelopment projects that fall under “priority project” categories. The goal of the *Model SUSMP* is to develop and implement practicable policies to ensure to the maximum extent practicable that development does not increase pollutant loads from a project site and considers urban runoff flow rates and velocities. This goal may be achieved through site-specific and/or drainage area-based or shared structural treatment controls. Each Copermittee developed a local *SUSMP* process based on the *Model SUSMP* to accommodate jurisdictional components.

Under the local *SUSMP*, each Copermittee will approve the *SUSMP* project plan(s) as part of the development plan approval process for discretionary projects, and prior to issuing permits for ministerial projects. San Diego Bay Watershed Copermittees are in the process of implementing the *SUSMP* as an initial step to help reduce COCs in local water bodies.

5.2.2.2 Source Water Protection Guidelines Project

Protecting existing local water sources is a critical, though often overlooked, component of planning for regional water supply reliability. The City of San Diego Water Department and others have embarked on an effort to produce the Source Water Protection Guidelines (Guidelines), which will provide a road map for sensible development, increase the reliability of the water supply system, and will likely reduce the cost of drinking water treatment.

The City of San Diego has nine raw drinking water reservoirs, two of which are in the San Diego Bay watershed – the Upper and Lower Otay Reservoirs. Sweetwater Authority manages Sweetwater and Loveland Reservoirs, which are also in the San Diego Bay watershed. All of the reservoirs store local runoff and most also store imported water that is piped into the region through aqueducts. The reservoirs are critical components of the regional water supply system. However, the quality of water stored in these reservoirs is at risk because of pollutant loads associated with urbanization within the reservoirs' basins. Recent studies have identified runoff from urban land uses, construction projects, and related development activities in the watersheds as the largest sources of pollution to the reservoirs.

Currently, the City of San Diego Water Department and Sweetwater Authority Department of Water Quality evaluate and comment on developments proposed within their reservoir watersheds. Both agencies provide comments on a case-by-case basis without the benefit of an overall strategy. Sweetwater Authority has an evolving watershed management program as further described in Section 6.4 of this document. The City of San Diego Water Department has not been able to give land use authorities consistent input on what developers need to consider in order to protect drinking water sources. The City of San Diego Water Department, with input from a Technical Advisory Committee, has begun the process of developing the Guidelines to ensure that land use planners adequately evaluate development projects in ways that ensure protection of the local source waters. City staff and possibly other local agencies will use the Guidelines as part of the development review, comment, and consideration process. Land developers may use the Guidelines in conceiving and designing projects located within basins that have the potential to affect water reservoirs.

The Guidelines will build upon existing land use, zoning, and building code regulations. The primary goal of the Guidelines is to identify water quality control measures that would specifically address potential sources of pollution associated with urban runoff within the basins of local raw drinking water reservoirs. The Guidelines will also include recommendations for the long-term maintenance of the control measures and effective monitoring techniques. Project implementation includes outreach and education components.

In order to develop a better understanding of pollutants of concern (associated with runoff) to local reservoirs, the project team will rely primarily on the experience of the San Diego Water Department staff, including water treatment plant operators, existing studies and reports on the reservoirs and associated sub-watersheds (e.g., Watershed Sanitary Surveys and 2001 Update), as well as other related water quality data. Other information to be considered include findings from a land use sensitivity model, scientific research and literature reviews, recreational use of the reservoirs, existing and planned future land use activities, as well as physical characteristics of the basins (e.g., topography, vegetation, and soils).

Planning for drinking water protection by creating the Source Water Protection Guidelines will provide a road map for sensible development. The San Diego Bay Watershed Copermittees intend to make use of the Guidelines once they have been developed.

5.3 Implementation Plan

A summary of the activities that will be implemented by the San Diego Bay Watershed Copermittees to address the major water quality problems (identified in Section 4 above), including the responsible parties and a tentative schedule is presented in Table 5-1.

Table 5.1 Implementation Plan for Short-term and Long-term Activities to Address Major Water Quality Problems for the San Diego Bay Watershed

Activity	Responsible San Diego Bay Watershed Copermittees	Tentative Schedule
Short Term		
Implementation of Diazinon TMDL	City of La Mesa, City of Lemon Grove, City of San Diego, Port of San Diego, County of San Diego.	Currently Underway
Regional IPM Campaign	All	2003 and beyond
Bacteria Source Investigation	All	2003 and beyond
Data Collection	All	2003 and beyond
Long Term		
SUSMP Implementation	All	2003 and beyond
Source Water Protection Guidelines	All	